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CONTENTS.

Original Communications.

PAGE

On the Treatment of Affections of the Stomach. By Professor Dujardin-Beaumetz..... 577

A Research to determine the Action of Nitrous Oxide, Nitrogen, Oxygen, and Carbonic Acid upon the Circulation, with Especial Reference to Nitrous Oxide Anæsthesia. Part II. By H. C. Wood, M.D., and David Cerna, M.D..... 583

The Values, Relations, and Dangers of the Anæsthetics (concluded). By G. Archie Stockwell, M.D., F.Z.S..... 589

The Treatment of the Morphine-Disease. By J. B. Mattison, M.D..... 599

Cactus Grandiflorus in Heart-Disease. By J. E. Engstad, M.D..... 606

Leading Articles.

Death of Dr. William Brodie..... 608

Diuretic Properties of the Elder (Sambucus Nigra)..... 609

Some New Remedies for Whooping-Cough..... 610

Orexin Again..... 611

The Treatment of Chronic Bright's Disease..... 612

Reports on Therapeutic Progress.

Bromoform in Whooping-Cough..... 607

The Excretion of Balsams in the Urine 614

PAGE

Susceptibility to the External Employment of Tannic Acid..... 616

Pilocarpine as an Antagonist to Belladonna..... 617

The Treatment of Syphilis by Subcutaneous Injection of Mercurial Preparations..... 617

Sugar in the Blood..... 618

Ichthyol in Diseases of Women..... 619

Thallin in Typhoid Fever..... 619

Observations on the Proportions of the Chief Proteids occurring in the Urine in Various Forms of Albuminuria..... 620

Coto Bark and Cotoine in the Treatment of Diarrhœa..... 620

Topical Action of Drugs on Secretion... 621

Salicylate of Theobromine..... 621

Excision of the Optic Nerve and Avoidance of Enucleation..... 621

The Chemistry of the Gastric Juice as an Element in Diagnosis and Therapeutic Indication..... 622

The Excretion of Mercury in Relation to the Various Methods of its Employment..... 623

The Value of the Different Hypnotics.. 623

Tracheal Injections as a Mode of Medication..... 629

A Procedure for washing out the Male Bladder without the Use of a Catheter 629

The Surgical Treatment of Tuberculosis of the Pleura and Lung..... 630

Eczema from the Use of Creolin..... 631

PAGE

Creosote in Phthisis..... 632

Iodosulphate of Cinchonine..... 632

Antiseptic Curetting of the Uterus in Puerperal Endometritis..... 633

Paraguay Tea..... 633

Treatment of Diphtheria by Inoculation with the Microbes of Erysipelas..... 635

Reviews..... 635

Correspondence.

Paris Letter..... 638

Berlin Letter..... 641

Notes and Queries.

Disinfection by Fumes of Burning Sulphur..... 643

The Dose of the Alkaloids of Hyoscyamus..... 644

Bleaching Teeth..... 645

The Chemistry and Physiological Action of Phosphorous Oxide..... 646

Nitroglycerin in Asthma..... 647

For the Relief of Earache..... 647

Thiol in Skin-Diseases..... 647

The Treatment of Croup..... 647

The Effect of Oil and other Substances on the Secretion of Bile..... 647

The Action of Mono- and Bichloral Antipyrin..... 648

Injections of Ether for Neuralgia..... 648

Otorrhœa Pellets..... 648

Anæsthetic Mixtures..... 648

Original Communications.

*ON THE TREATMENT OF AFFECTIONS OF THE STOMACH.**

LECTURE II.—ON THE NEW MEANS OF EXPLORATION OF THE DIGESTIVE FUNCTIONS.

BY PROFESSOR DUJARDIN-BEAUMETZ,† PARIS, FRANCE.

GENTLEMEN:—I desire to devote this lecture to the study of the new means of investigation which enable us to obtain a truly clinical appreciation of the processes of gastric digestion in health and disease; then we shall examine the prognostic value and utility which therapeutics may derive from these studies in the treatment of gastric affections.

In this undertaking I shall be guided not only by works published in Germany, but also by two remarkable theses, the one defended at Paris by an *interne* of the hospitals, Dr. Gaston Lyon,‡ the other having for its author a pupil of the faculty of Nancy, Dr. Georges;§ and, lastly, I have to own my

* From advance sheets, revised by the author (translated by E. P. Hurd, M.D.). Lectures delivered in Cochin Hospital, Paris, France.

† Member of the Academy of Medicine, Physician to the Cochin Hospital, Paris, France.

‡ G. Lyon, "L'Analyse du Suc Gastrique" (*Thèse de Paris*, 189c).

§ L. Georges, "De l'Étude Chimique du Contenu Stomacal" (*Thèse de Paris*, 1890).

indebtedness to a review which has appeared in my own journal, the *Bulletin Général de Thérapeutique*, and which was written by Dr. Paul Cheron.*

The digestive functions consist of two distinct processes. The one, a physical act, pertains to the movements which the muscular coat of the stomach communicates to the aliments introduced, bringing them into contact with the different points of the mucosa, then causing them to pass into the intestine. The other is a chemical act, whose end is to subject the aliments, and in particular the albuminoids, to a special modification, which renders them assimilable.

Which of these two processes is of the most consequence? According to some physiologists, the chemical act is much more important than the physical act. This is by no means the case, gentlemen, and if you could imagine a stomach without muscular contraction, digestion would be impossible; while, on the contrary (as I shall show you by and by), by virtue of the functions of the pancreas, life is compatible with a stomach almost devoid of gastric juice. But in reality these two acts are necessary, and the one completes the other; so every modification affecting either the one or the other of these acts will have for its consequence a modification in the gastric digestion, and may be the starting-point of functional troubles, to which has been given the name of *dyspepsia*.

As you see, I reject the exclusive opinion of Professor G. Sée, who regards dyspepsia as always chemical in its origin.

We shall, then, have to examine successively the new means of investigation which enable us to understand the modifications which may take place in the physical and chemical acts of digestion. But before taking up this study, I deem it important to sum up briefly what physiology has taught us the last few years respecting the movements of the stomach and respecting the gastric juice.

Described for the first time by Helvetius, the muscular fibres of the stomach constitute in man, as you know, three layers,—one of longitudinal, one of circular, and one of elliptical fibres. By their contractions these fibres impart to the stomach certain movements, which have been well studied the last few years by Schiff, Laborde, Hoffmeister, and Schultze.

Schiff maintained that these movements only take place during the digestive act. According to him, the movements consist in a simple corrugation or wrinkling of the surface of the stomach. These movements, more active towards the median part of the stomach, divide the greater curvature into two parts. Moreover, Schiff adopts the view of Beaumont, who maintained that these movements have for their object to cause the alimentary bolus to undergo certain revolutions, which bring it in contact with all points of the mucosa.

This notion of the circular movements has been combated by Laborde, who had the advantage over all his predecessors of examining the human stomach; he operated, in fact, on the digestive organs of criminals a few minutes after their death.

According to him, the movements take place from the cardia to the pylorus, and from the pylorus to the cardia. Moreover, by its contractions, the stomach is divided into two pouches: the one, more voluminous than the other, corresponds to the great cul-de-sac and the greater curvature; the other, to the lesser curvature. Owing to this arrangement, liquids may pass almost directly from the cardia to the pylorus by following the lesser curvature.

This disposition has been confirmed in the dog by Hoffmeister and Schultze, who compare the contracted stomach to an hour-glass, with a large swelling corresponding to the cardia and a small one corresponding to the pylorus. It is in the large swelling that the chemical acts of digestion take place. But these experiments have not the value of those of Laborde, because, as Collin has remarked, each animal species has special stomachal contractions, and we cannot, from comparison with the contractions in animals, form conclusions as to the mode of contractions in man.

We can, moreover, without resorting to experiments and without laying the stomach bare by dissection, examine these contractions clinically. In fact, in patients affected with dilatation of the stomach, with thickening of the muscular wall, these movements of the stomach are very clearly perceived, and you have only to apply cold in order to see them. You will then witness a wavy movement of the gastric walls, affecting alternately the greater tuberosity, then the pyloric region; and while the one lets itself become distended, the other contracts; thus there are formed elevations and depressions quite

* Paul Cheron, "On the Chemical Alterations of the Gastric Juice and their Treatment" (*Bull. Gén. de Thér.*, t. cxviii. pp. 145, 215, 264).

appreciable to the naked eye. These movements present a real alternation, comparable in a certain measure to what takes place in the auricles and ventricles of the heart, and thus you have a rhythm of the stomach as well as a rhythm of the heart.

Much more complex is the study of the gastric juice, and you will see that, notwithstanding the numerous works that have been written on this subject, there remain still many obscure points connected with this question.

I need not recall to your minds the structure of the gastric mucous membrane, or of the glands whose secretion constitutes its principal function. I must, however, tell you that the view of Kölliker, that there is an abrupt line of demarkation between the pepsin glands occupying the great cul-de-sac of the stomach and the mucous glands surrounding the pylorus, is no longer tenable; and since the labors of Haidenhain, Rollet, and Ebstein, it is now known that there is an intermediary zone, where there are both mucous glands and pepsin glands.

If there seems to be agreement respecting the mucous glands, which are characterized solely by superficial cells, there is not the same agreement respecting the pepsin glands, which contain at the same time voluminous cells with large nuclei, and certain cells surrounding the orifice of the glands, and which are called *border cells*. In fact, some have maintained that the principal cells (or the large cells) secrete exclusively the gastric juice; others affirm that this *rôle* belongs exclusively to the border cells. Lastly, there is a third doctrine, which affirms that the gastric juice is secreted both by the border cells and the large cells. I pass now to the study of the gastric juice.

That which characterizes essentially the gastric juice is its extreme acidity. This is one of the most striking facts connected with this secretion. There has been much discussion as to the nature of the acid, some maintaining that it is lactic, others hydrochloric acid.

To-day there is general agreement as to the following facts: There exist in the normal state in the gastric juice lactic acid and hydrochloric acid; but the lactic acid is always the product of digestion, while the hydrochloric acid is the acid of the gastric juice, and appears in this secretion at the moment of the entrance of the food into the stomach. The researches of Ewald are in this respect absolutely demonstrative.

I do not speak of the opinion of Poulet, of Plancher-les-Mines, who has insisted that this acid is hippuric; this view is not held by any physiologist. So, then, hydrochloric acid is the normal acid of the gastric juice. Is it free or is it combined with other products? Here widely-diverging views have been put forth.

Ewald, as well as Hayem, has maintained that the acid is not free, and that it is combined with the various albuminoid substances which are in contact with it. At the same time, Ewald rejects the hypothesis of Richet,—viz., that the hydrochloric acid is combined with leucin, this substance, like tyrosin, being always a product of the decomposition of the ingesta.

Hayem,* in continuing his interesting researches with Winter on the stomachal chemism in the normal and pathological states, thinks that the hydrochloric acid is combined with albumen in the gastric juice in the state of hydrochlorate of the amide acids. These amide acids result from a breaking up of the primitive albuminoid molecule.

It has also been a matter of dispute whether the stomach when empty secretes gastric juice, and Peck affirms that this secretion ceases during fasting, or is so much diminished that it may be considered as *nil*.

Besides the hydrochloric acid, the gastric juice contains two ferments,—pepsin and the lab-ferment, or pexine. I shall say but little about pepsin. We know that it transforms albuminoids into peptones, but despite numerous researches made on this subject, we are ignorant of the true nature of these peptones. We know only that to each kind of albumen correspond special peptones, and, since the researches of Heninger, there is pretty general agreement in considering these peptones as hydrates of albuminoid matters.

The lab-ferment or pexine is a substance which causes the coagulation of milk, and those of you who would like to know more about this pexine would do well to consult the thesis of Dr. Pagès.†

The new microbial theories, for which we are so largely indebted to Pasteur, have but little modified our notions as to these two ferments,—pepsin and pexine. If Duclaux and Vignal have shown that the buccal cavity contains a great number of microbes, whose effect is to peptonize albuminoids, Dastre, on the other hand, has demonstrated that by sterilizing gastric juice, we do not destroy,

* Hayem and Winter, "Researches on the Stomachal Chemism in the Normal and in the Pathological State" (*Bull. Méd.*, 1889).

† "Researches on Pexine" (*Thèse de Paris*, 1888).

though we attenuate, its digestive power considerably, so that we are warranted in saying that certain microbes are favorable to peptonization.

As for the origin both of the acid and of the ferment of the gastric juice all is obscurity. The old theory of peptogenous substances, so much in vogue several years ago, seems to be abandoned, and there is a general admission that the stomach does not directly form pepsin, but a body called *pepsinogen* or *propepsin*, which then transforms itself into pepsin.

As for the hydrochloric acid, it is believed to come from the decomposition of the chlorides contained in the blood, and the recent researches of Professor Hayem tend to justify this view.

After these preliminary observations, I come to the study of the new processes which enable us to understand both the movements of the stomach and the chemism of this organ. Let us begin with the methods of investigating the movements of the stomach.

I have just told you that we may in certain cases observe *de visu* the movements of the stomach through the abdominal walls. But these are only exceptional cases, and to judge of the contractility of the stomach we must make use of processes more or less complex; the most simple and advantageous is most certainly that of Leube.

Basing himself on physiological data, Leube maintains that seven hours after a normal meal the stomach, in the healthy state, should be entirely empty. It is sufficient then to give to the patient a meal of meat, eggs, and bread, then to practice lavage of the stomach seven hours after this meal, and you will find the stomach devoid of food.

Klemperer has proposed a process derived from the same method, but much more complex. It is called the *oil process*. It is based on this fact, that, in the physiological state, seventy to eighty grammes of oil pass from the stomach into the intestine in two hours. The operator then introduces, by the aid of the œsophageal sound, one hundred grammes of oil; then, with the stomach-pump, he aspirates, at the end of two hours, the contents of the stomach. The stomach is next washed out with water, which is allowed to settle, the oil is dissolved out by ether, and a calculation is made of how much oil has passed into the intestine. This is a process which is much more complicated than that of Leube, and does not seem to present any advantage over the latter.

The third means is based on chemical reactions. There is a substance to-day very much used in surgery,—salol,—which results from the combination of salicylic acid with phenic acid. One of my pupils, Dr. Lombard, has shown all the therapeutic applications which may be made with salol.*

This body in the presence of alkalies is decomposed into phenic acid and salicylic acid. Ewald has utilized this property in order to determine the contractility of the stomach. He administers 1 gramme of salol to the patient, and examines the urine to find at what moment salicylic, or rather salicyluric, acid appears in that secretion. In the normal state this acid makes its appearance at the end of half or three-quarters of an hour. When there is a delay, Ewald affirms that this is due to the fact that the stomach, through sheer inactivity, has not let its contents pass into the intestine.

Certain objections may be made to this test. In a thesis which bore a prize from the faculty, and which was written by one of my best pupils, Mlle. Dr. Chopin,† it appears that the elimination of salicylic acid depends in great part on the condition of the kidney, and it may be considerably retarded in old people. On the other hand, it depends on the nature of the meal, and especially on the nature of the liquid ingested. We may cause the appearance of the salicylic acid to vary considerably, as Bourget has shown.

The same objections may be made to the modifications of Ewald's method proposed by Hubert, who examines the urine not only to ascertain at what moment the salicylic acid appears there, but also to find out the time when the reaction disappears, a period quite remote from that of the ingestion of food in persons with inactive stomachs.

Hence I am disposed to make little account of these chemical processes, and adhere exclusively to the method of Leube. I come now to the clinical means put in use for the study of the gastric juice.

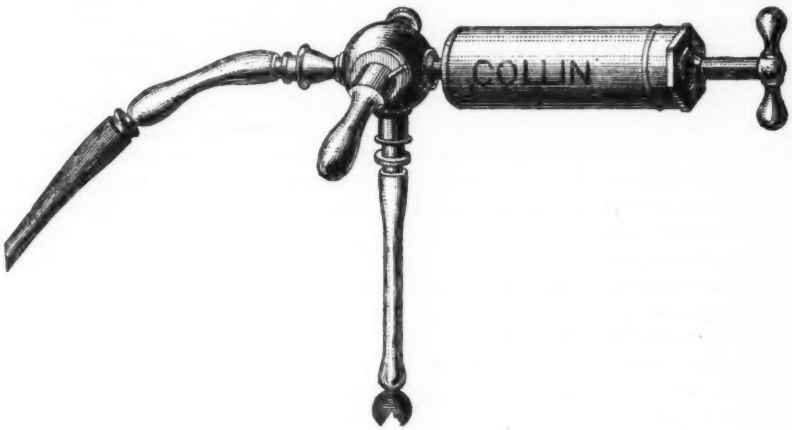
All these clinical means are exclusively based on the employ of the stomach siphon, furnished or not with a pump to aspirate the liquid from the stomach. I have already in my "Alimentary Hygiene" set forth the processes heretofore employed to obtain gastric juice.‡ All these processes are aban-

* Lombard, *Thèse de Paris*, 1887.

† G. Chopin, "On the Elimination of Salicylic Acid" (*Thèse de Paris*, 1889).

‡ Dujardin-Beaumetz, "Hygiène Alimentaire," 1889, p. 201.

doned save that of the pump, which is Collin's invention, and is a model of its kind. When you have no pump, you can use the simple stomach-tube, making a siphon of it. But before endeavoring to collect the gastric juice, it is necessary to give the patient a repast, called the *trial meal.*



Many trial meals have been recommended. Thus Riegel, Gluzinski, Jaworski, Boas, Ewald, Ritter, Hirsch, and Professor Sée have each proposed a trial meal.

From a clinical point of view, two only need be retained, that of Ewald and G. Sée. That of Ewald is almost exclusively employed in Germany, where it bears the name of *probefrühstück.* It consists of a little white bread, weighing thirty-five grammes (about an ounce), of a tumbler and a half (three hundred grammes) of water, or of light tea, without milk or sugar. This meal is given in the morning, on an empty stomach, and the gastric juice is examined one hour after the ingestion of the food.

Sée gives a meal which is more complex, composed of meat (sixty to eighty grammes) hashed very fine, of white bread (one hundred to one hundred and fifty grammes), and of a glass of water. He recommends to the patient a prolonged mastication. The examination of the gastric juice is made two hours after the ingestion of this meal.

Georges maintains that this meal gives rise to the production of lactic acid. Hence he prefers Ewald's test meal, to which he adds two eggs in the shell. It is well understood that the aspiration made with the pump should not be too energetic, and it suffices to obtain from twenty to twenty-five cubic centimetres of gastric juice in order to practise the examination. The gastric juice is filtered, then is acted upon by the reagents, of which I will now speak.

Almost all these tests (if not all) are based on the modification which the hydrochloric acid effects in the divers coloring materials obtained from coal tar, and I will begin by the reagent which has been longest in use,—methyl violet.

It was Laborde and Dusart,* who, in 1874, sixteen years ago, were the first to propose methyl violet for the study of the modifications of the gastric juice. It is true that they applied it rather to physiological than to clinical studies. Since then Maly has taken up again the method of Laborde, and in 1887 applied it to practical use.†

To apply this test you thus proceed:

Into fifty cubic centimetres of water let fall three or four drops of methyl violet, called *Paris violet;* then pour into the solution the gastric juice which you are to examine, and if hydrochloric acid be present, the violet will turn to deep blue. An amount of hydrochloric acid equal to .5 per thousand is needed to produce this reaction.

Lactic acid also gives the same coloration, but it must be very concentrated (at least ten per cent.). The presence of peptones, in the proportion of four per cent., prevents the reaction from taking place, even when hydrochloric acid exists to the extent of one per thousand in the solution.

* Laborde, "The Coloring Matters applied to the Research and Determination of the Free Acid of the Gastric Juice" (*Bulletin Général de Thérapeutique*, t. cxii. p. 86, 1889).

† Richard Maly, "Untersuchungen über die Mittel zur Säure Bildung in Organismus und über einige Verhältnisse der Blutserum" (*Zeitschrift für Physiologische Chemie*, t. i. p. 174, 1887).

The second process is that of tropœoline, recommended by Leube, and in 1884 I published several articles, making known the advantages which may be obtained from this test.*

This is the way to test gastric juice by tropœoline, or the Poirrier Orange, No. 4: Into a watch-glass, placed on a white piece of paper, or other white surface, you pour one of the following solutions, either a small quantity of an aqueous solution of tropœoline, one per cent., or of an alcoholic solution, containing 1 part of alcohol to 3 parts of distilled water, with enough tropœoline to make a centesimal solution; then to the liquid in the watch-glass you add a part of the gastric juice to be examined, and if there be hydrochloric acid present, the liquid assumes a very characteristic carmine-red color, which is in striking contrast with the normal yellow color of the tropœoline solution.

Like the methyl violet, this reaction may also be obtained with lactic acid, but a large proportion is needed,—as much as two per thousand; this test is very sensitive, and is but little influenced by peptones. Hence it is that Georges places it at the head of the tests to be employed.

It is also on a change of color that the tests with Congo red and "brilliant green" are based. In applying the first reagent, test-papers saturated with the pigment (or a solution of the pigment) may be used; these, under the influence of hydrochloric acid, pass from a clear red to a blue color. To obtain this reaction, one milligramme per thousand of hydrochloric acid is sufficient. There would be required as much as 1.20 grammes per thousand of lactic acid in order to give the same reaction. Georges regards this as an excellent test.

The "brilliant green" test was proposed by Professor Lépine. He makes use of a two per cent. solution, and the presence of the acid makes the mixture pass from a greenish blue to a deep green. The inconvenience lies in the difficulty of appreciating the passage from a greenish blue to green.

Lastly, Gunzburg's test, especially vaunted by Germain Sée and his pupils, is the most sensitive of all. It will reveal the presence of one-twentieth per thousand of hydrochloric acid, only the process is quite complex, and heat is needed in order to bring out the reaction; so that this test is not so well adapted for clinical test as some others. This is the composition of this reagent:

℞ Phloro-glucine, 2 grammes;
Vaniline, 1 gramme;
Alcohol at 80°, 100 grammes. M.

This solution is of a reddish-yellow color.

Into a porcelain capsule you will put ten or twelve drops of the gastric juice to be examined, and add three or four drops of the reagent. Then you will heat the mixture slightly, taking care not to raise the temperature above 38° to 40° C.; there will then appear along the borders of the capsule a cinnabar-red coloration.

If this reagent is extremely sensitive, it presents the serious disadvantage that its reactions are masked by the peptones and albuminoid bodies, hence I think that we should trust chiefly to the tropœoline and methyl violet tests, and only make use of the Gunzburg test in exceptional cases.

In certain circumstances it is desirable to test for lactic acid. For this there is but one reagent,—viz., that proposed by Uffelmann. The solution must be extemporized for the occasion, according to Lyon's recommendation. Drop into a mixture of twenty cubic centimetres of distilled water and ten cubic centimetres of phenic acid (four per cent.), two or three drops of the *liquor ferri perchloridi*. The mixture takes on an amethyst hue, which turns to bright yellow in presence of lactic acid.

There remains yet the process for testing the acidity of the gastric juice. I shall not speak of the methods of Leon and of Winter, which are laboratory methods, and shall only mention the clinical processes. The following is a convenient method: Take ten cubic centimetres of gastric juice, and add a few drops of a solution of phenol-phtaleine, which has the property of changing to a lively red in the presence of a free alkali. Then add, drop by drop, a standard solution of soda,—one-tenth,—and make your calculation on the basis that one cubic centimetre of the solution neutralizes .003646 of HCl. In the normal state it takes from four to six cubic centimetres of this decimal solution of soda to produce the reaction.

Lastly, it is well to test the digestive power of the gastric juice by practising with it artificial digestions. For this purpose, you will put into a test-tube five cubic centimetres of

* Dujardin-Beaumetz, "On the Diagnostic Value of the Processes for the Recognition of the Acidity of the Gastric Juice" (*Société Médicale des Hôpitaux*, December, 1884, and *Gazette Hebdomadaire*, December 4, 1884, p. 804).

gastric juice and a little block of albumen,—from five to six millimetres square. Place the whole in a stove, and expose it to a temperature of 38° to 40° C. You may make at the same time, for purposes of comparison, artificial digestions by the aid of pepsin.

But, in order to give you an idea of the minutiæ of the processes employed in Germany to test the digestive power of the gastric juice, allow me to quote the method counselled by Gunzburg to ascertain the chemical power of the stomach. This method is based on the presence of iodide of potassium in the saliva, when this salt has been absorbed into the circulation.

Gunzburg takes a pastille of iodide of potassium, and encloses it in an envelope of caoutchouc, which is closed by means of threads of fibrin that have been preserved in alcohol. These little pastilles are dipped into glycerin; then one of them is taken and placed in a gelatin capsule, and the patient is made to swallow it. Then the saliva of the patient is examined, and the moment noted when the presence of iodine is revealed by the starch test. By the time which has elapsed, one is able to decide as to the digestive value of the gastric juice, for this fluid must first destroy the threads of fibrin before the pastilles of iodide of potassium are set free.

I do not know whether the method of Gunzburg is much employed in Germany, but it must be admitted that in France it is really impracticable. It must be confessed, in fact, that the patient and the physician will need a great deal of patience in order to subject for several hours, and from moment to moment, the saliva of the patient to a chemical examination which shall reveal the presence of iodine, and when the iodine is detected, nothing is solved thereby, for the pastille may have passed into the intestine before its threads are dissolved. Therefore, I think that it is just as well to reject these too complicated methods, which belong rather to the laboratory than to the department of clinical medicine.

You are now in possession of three orders of means which will enable you to detect the presence of free hydrochloric acid, the presence of lactic acid, the acid value of the gastric juice, and, lastly, its digestive power.

With all these methods, can you dispense with the clinical examination, and on these data alone establish your diagnosis and your therapeutics?

No, gentlemen; and when you come to realize all the time and pains and care which these chemical researches necessitate, and the meagre results which they bring, you will be tempted to say that the mountain has labored and brought forth a mouse. In fact, as Georges has well said, the diseases of the stomach, from a chemical point of view, group themselves into two classes,—those where there is hypersecretion of hydrochloric acid, and those where there is hyposecretion.

In the first group there is but one disease,—viz., simple ulceration of the stomach; in the second are grouped all the other affections,—gastritis, dilatation of the stomach; in a word, affections the most widely different. Hence, Hayem, in his recent researches, has shown that the presence of free hydrochloric acid does not enable one to decide respecting the diagnosis of the affections of the stomach, since its presence is an exceptional fact.

Do I mean by this that we must abandon these researches? By no means. These researches furnish us a complement of information which enables us to confirm, in a certain measure, the diagnosis to which we may have arrived by the other and really chemical means. But it is always the latter which should have the first place, and the study of the treatment of the divers diseases into which I am about to enter will be an absolute proof of what I maintain, and this proof I shall endeavor to make as complete as possible when I take up, as I intend to do in the next lecture, with the help of all the new light of modern research, the consideration of cancer of the stomach and its treatment.

A RESEARCH TO DETERMINE THE ACTION OF NITROUS OXIDE, NITROGEN, OXYGEN, AND CARBONIC ACID UPON THE CIRCULATION,

WITH ESPECIAL REFERENCE TO NITROUS OXIDE ANÆSTHESIA.

By H. C. Wood, M.D., assisted by David Cerna, M.D., Philadelphia, Pa.

(Continued from page 515.)

Part II.

The first series of experiments in the second part of this research was made to determine the effect in the inhalation of oxygen upon the pulse and arterial pressure.

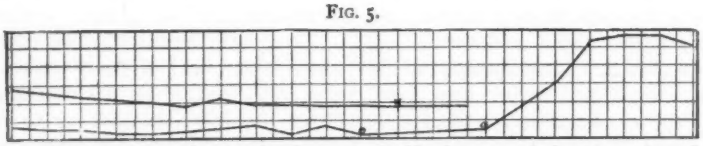
In the first of these experiments (Experiment 12), after the inhalation of pure oxygen gas for two minutes, the pulse was four beats

per minute below its starting-point, and the arterial pressure three millimetres below its starting level. In Experiment 13 the pulse, at the end of four minutes of inhalation, had been reduced eight beats, while the blood-pressure had fallen four millimetres. That even this slight fall of pulse and blood-pressure was not directly the outcome of the action of the oxygen, but was due to indeterminable circumstances, is shown by the fact that, the inhalation being continued, one minute and forty seconds later the pulse was two beats per minute more than at the start, while at the end of the two minutes and forty seconds the pressure was one millimetre above its original place. In Experiment 3 the pulse, after three and a half minutes of inhalation, was three beats per minute higher than at the start, and the blood-pressure two millimetres.

to rest for ten minutes; after this it was given a second inhalation of the gas, which was followed by a slight rise of the pressure, so that in thirty seconds, when the reflexes were gone, the arterial pressure was seven millimetres above the norm; then the pressure dropped rapidly,—in fifteen seconds twenty-two millimetres, in thirty seconds forty-eight millimetres; then for a few seconds it remained steady, but soon recommenced to fall, and in one minute and fifty-five seconds after the beginning of the inhalation had reached almost to the zero line; fifteen seconds later the animal was dead.

In Experiment 15, with pure carbonic acid, the inhalation of the gas was followed by an immediate, rapid, and steady fall of the arterial pressure, which reached its maximum in a minute and a half; after this time the pressure

FIG. 5.



OXYGEN.—Curve showing the changes in the blood-pressure during two prolonged inhalations of pure oxygen. The sudden rise in the pressure at the end of the second line was due to a mechanical arrest of respiration.

These experiments certainly show that the inhalation of pure oxygen gas has no influence upon the circulation, and would seem to warrant the conclusion that oxygen gas has no direct influence upon the circulation, and that, therefore, the fall of pressure produced by excessively rapid and forced respiration is the result of the pumping out of the blood of carbonic acid, rather than of any increase in the oxygen of the blood, while the rise of the arterial pressure in asphyxia is due to the presence in the blood of an excess of carbonic acid.

The conclusion just reached naturally led up to a direct experimental study of the effect of carbonic acid upon the arterial pressure. In carrying out such study we have made several series of experiments.

In the first series the animal was made to breathe *pure* carbonic acid. In the first experiment (Experiment 14) the reflexes were completely abolished in thirty seconds; the arterial pressure fell in fifteen seconds twelve millimetres, remained at about this point for fifteen seconds longer, when it slowly began to rise, and in fifty seconds more was five millimetres above its norm; it then rapidly fell again, so that in thirty seconds later it was sixty millimetres below the norm. The animal was then allowed to recover consciousness and began to rise, but failed to reach its norm during the inhalation. In this experiment it was evident that the animal obtained some air mixed with the gas, for at the end of seven minutes the pressure was well maintained; the valve used in the mouth-piece was subsequently found to be leaky, and without doubt air passed through it during inhalation. The second inhalation was in this case followed by an immediate and rapid fall of pressure, zero being reached in about a minute and a half.

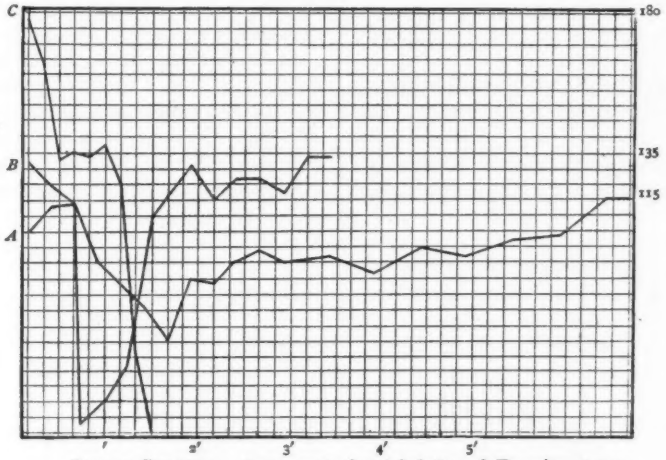
In Experiment 16 the conjunctival reflex was completely gone after thirty seconds of inhalation. The arterial pressure fell for thirty seconds, then rose to a little above the norm, but about a minute and a quarter after the beginning of the inhalation began to fall and rapidly lowered, so that one minute and forty-five seconds later it was about sixty millimetres below the norm. After ten minutes of consciousness a second inhalation was followed by complete abolition of reflexes in thirty seconds, and, after a brief primary rise by a steady but somewhat irregular fall of pressure, zero and death being reached in a little less than two minutes.

In order to give a better idea of these changes, Dr. Cerna has plotted them as given below.

In Fig. 6 the line *A* represents the first inhalation of Experiment 14, the second not being plotted; the line *B* represents the blood-pressure in the first inhalation of Experiment 15; *C*, the second inhalation.

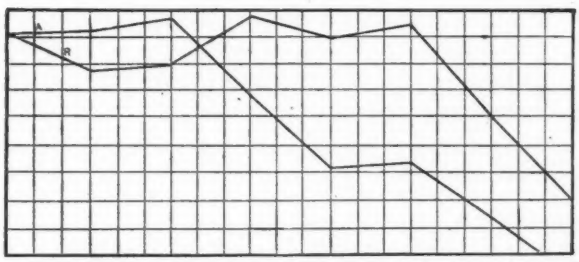
the inhalation. The result obtained in Experiment 18 was similar. In seventy seconds the pressure fell eighty millimetres, but after that it was nearly stationary, or even rose a little for fifty seconds, when it began again

FIG. 6.



CARBON DIOXIDE.—*A* represents first inhalation of Experiment 14; *B* represents first inhalation of Experiment 15; *C*, second inhalation.

FIG. 7.



EXPERIMENT 16.—*A* and *R* represent, respectively, first and second inhalations.

Figure 7 represents Experiment 16. *A* the first, *R* the second inhalation.

The tracings in these experiments vary so much as to indicate that in some of them air got in with the carbonic acid. We, therefore, made the following experiments with a mercurial valve, so arranged that leakage was impossible.

In Experiment 17 the inhalation of pure carbonic acid was followed by an immediate and progressive, although irregular, fall of the arterial pressure. In forty-five seconds the pressure was twenty-eight millimetres below the norm; in one minute, fifty-seven millimetres; in one minute and a quarter it was sixty-two millimetres; and in one minute and a half, one hundred and two millimetres below the norm. Death occurred one and three-quarter minutes after the beginning of

to slowly fall, and in twenty seconds more was one hundred and eight millimetres below the norm. Death occurred in one minute and a half after the beginning of the inhalation.

The effects of pure carbonic acid upon the arterial pressure are usually to lower it with more or less steadiness until death is attained. It has seemed to us very probable that diluted carbonic acid may increase arterial pressure, although, when in overwhelming amount, the gas depresses the pressure.

We have, therefore, made a series of experiments with carbonic acid diluted with known proportions of oxygen or air. The first of these two sets of experiments are those in which carbonic acid and oxygen were employed.

In Experiment 19 the inhaled gas contained

66.66 per cent. of carbonic acid and 33.33 per cent. of oxygen. The effect is shown in the following columns:

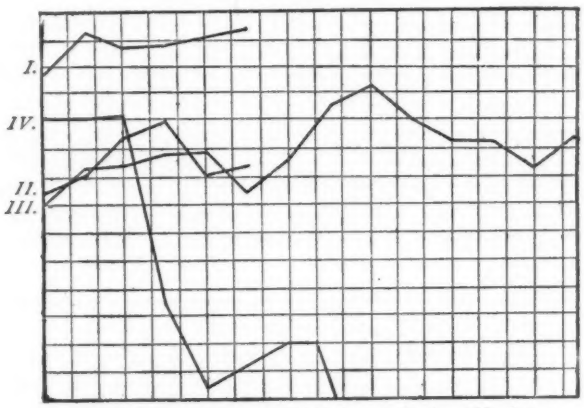
Beginning of inhalation.	Norm—N.
15 seconds.	N.
30 seconds.	N. + 10 m.
45 seconds.	N. + 6 "
1 minute.	N. + 31 "
1.30	N. + 52 "

In a second inhalation the arterial pressure rose in one and a quarter minutes to ten millimetres.

In Experiment 20 the first inhalation was made with a mixture containing sixty-four per cent. of oxygen and thirty-six per cent. of carbonic acid; in half a minute the pressure rose eleven millimetres, in one minute thirteen millimetres, in one minute and twenty seconds fourteen millimetres. In a second inhalation, a mixture containing 66.66 per cent. of oxygen and 33.33 per cent. of carbonic acid was used; in half a minute the arterial pressure rose twenty millimetres, but in half a minute more the pressure was only six millimetres above the norm. A third inhalation, after the animal had completely regained consciousness and had been allowed to rest fifteen minutes, was practised with the same mixture as was used just before. The result was a rise in thirty seconds of eleven millimetres, in one minute of eighteen millimetres, in one minute and a half of fourteen millimetres. The animal was then allowed to breathe air, but before consciousness was regained, violent convulsions, with great rise of the arterial pressure, occurred. After a rest of fifteen minutes an inhalation of pure carbonic acid was given; half a minute later the pressure was practically unchanged, but in the next fifteen seconds it fell sixty-five millimetres, and continued to fall irregularly, so that two minutes after the beginning of the inhalation it was one hundred and twenty-six millimetres below its starting-point; a few seconds after this death occurred.

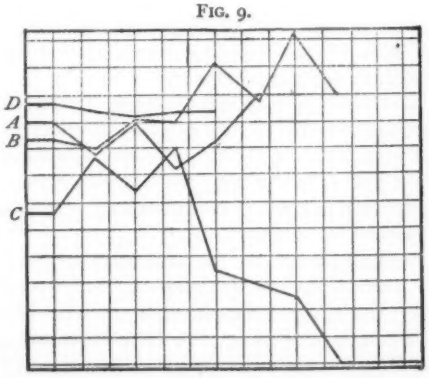
In Experiment 21 we administered by inhalation at first a mixture containing 66.66 per cent. of oxygen and thirty-three per cent. of CO_2. At the first trial the pressure rose in thirty seconds seven millimetres, in one minute twenty-six millimetres, in one and a half minutes thirty-eight millimetres, the rise not, however, being a steady one. Some minutes later a second inhalation failed to produce effect equal to that previously obtained; after thirty seconds the pressure was unchanged, and in

FIG. 8.



EXPERIMENT 20.—*I.*, inhalation, carbonic acid alone. *II.*, inhalation. *III.*, inhalation, each one-third oxygen. *IV.*, inhalation.

FIG. 9.



EXPERIMENT 21.—*A*, first inhalation of CO_2 + 2O. *B*, second inhalation of CO_2 + 2O. *C*, CO_2 alone, perhaps with a little O in it. *D*, O pure.

one minute it had only risen ten millimetres. After complete recovery from these inhalations the animal was given pure carbonic acid, and very shortly went into general convulsions, with great rise of pressure, followed by a rapid fall so soon as the convulsions ceased. Some time after the animal had regained its normal state it was made to inhale oxygen, the result being *nil* so far as the arterial pressure was concerned.

The experiments made with carbonic acid and air are two.

Experiment 22.—The mixture contained twenty-five per cent. of carbonic acid. The result was a slight rise of pressure, followed by a fall, as shown in the following columns:

Time.	Pressure.	
0	Norm.	Inhalation begun.
30	N. + 6	
1	N. + 16	
1.30	N. + 8	
2	N. + 10	

Experiment 23.—The mixture inhaled contained twenty per cent. of carbonic acid; in forty-five seconds pressure rose ten millimetres; in a second inhalation of the mixture, containing ten per cent. of carbonic acid, there was a rise, followed by fall, as shown in the following columns:

Time.	Pressure.	
0	Norm.	Inhalation begun.
30	N. + 7	
1	N. + 2	
1.30	N. + 2	
2	N. + 1	
2.30	N. + 2	

As a result of all our experiments upon the subject, we think that the following proposition is established: Carbonic acid, when breathed into the lungs alone, sometimes causes a slight and temporary rise in the arterial pressure, but usually at once, and always after a very short time produces a very decided fall of arterial pressure; carbonic acid, when taken properly diluted, distinctly increases the arterial pressure, apparently having the most power when mixed with oxygen in the proportion of two to one.

Though generally concordant, our results vary so much as to suggest that carbonic acid has a double action; that by stimulating the vaso-motor centre it acts to increase the pressure, while by inhibiting the heart it acts to lessen the pressure.

This naturally brings us to a study of the action of the gas upon the pulse.

The effect of C_2O upon the pulse is very pronounced.

Thus in Experiment 14 the pulse fell from 120 to 64, and in the second inhalation from 120 to 44; in the first inhalation the pressure being low, in the second high.

In Experiment 15 pulse fell from 120 to 36.

In Experiment 16 pulse fell from 135 to 40.

With mixture the effect was similar. In Experiment 20, C_2O, sixty-four per cent.; O, thirty-six per cent.; pulse fell from 140 to 62. In Experiment 21, C_2O, sixty-six per cent.; O, thirty-three per cent.; pulse fell from 156 to 44.

It must, therefore, be allowed that carbonic acid acts very powerfully as a pulse depressor.

The probabilities from the evidence already given are very strong that the rise of pressure and the fall of pulse are respectively due to stimulation of the vaso-motor and cardiac inhibitory centres, and to obtain positive knowledge we made the following experiments:

The first series of experiments were made upon dogs with vagi cut.

In Experiment 24, the pulse, after section of the pneumogastrics, when the inhalation was begun, was 156 per minute, and suffered no change from this rate for thirty seconds, when the respiration became stormy, and the enormous respiratory blood-curves so dominated the small pulse-waves that the latter cannot be counted in the tracing; thirty seconds later there was a rapid fall of the arterial pressure, accompanied by quick breathing and a return of the pulse to about 160.

In Experiment 25, both vagi being cut, the pulse before the inhalation was 120 to 140; ten seconds later it was unchanged; a few seconds after this there was developed a period of violent respiration, occasional respiratory curves of the pulse, with disappearance of the pulse-waves from the tracing. The dog was then allowed to recover consciousness. After the pulse had returned to its normal rate a second inhalation was given, which was followed in a very short time by the reappearance of enormous respiratory curves, and the disappearance from the tracing of individual pulse-beats. This condition continued until death, which occurred from failure of the heart.

In Experiment 26, the pulse, after section of the vagi, was 180. The inhalation of carbonic acid was followed by rapid fall of pressure, and twenty seconds afterwards the pulse was 200 and the pulse-wave excessively small; thirty seconds later the pulse was 120, but it subsequently fell, just before death, to 100.

In Experiment 27, the pulse, after the section of the vagi, was 189. Inhalations of

equal parts of air and carbonic acid were given, when the pulse rose in frequency, in half a minute being 240, and from this time varying during the continuance of the inhalation between 225 and 270. After this inhalation the animal was allowed to recover consciousness, and when the inhalation of pure carbonic acid was commenced the pulse was about 220; ten seconds later the respiratory curves so dominated the pulse-curves as to make the counting of the pulse-wave very difficult, but there seemed no change in the pulse. During the continuance of the inhalation, up to the time of death, the pulse-waves remained so minute that most of the time they could not be counted on the tracing, but fifty seconds after the commencement of the inhalation, the pressure being extremely low, the pulse was for a little while distinct enough to be counted at 200 a minute.

These experiments are substantially concordant in showing that, after section of the vagi, the inhalation of carbonic acid does not produce distinct slowing of the pulse. The contrast between the effects of the inhalation, without and with sections of the vagi, upon the pulse-wave is very great. Usually after the pure gas the individual pulse-wave in the animal is extraordinarily increased, while in the animal whose vagi has been cut, the pulse-wave, after the inhalation, becomes exceedingly small, or, in most cases, entirely obliterated.

In order to show this contrast, we append two tracings, both of them taken just before death, No. 1 with the vagi uninjured, No. 2 with the vagi cut.

pressure; which fall amounted, in twenty seconds, to eleven millimetres; in forty seconds, to forty-nine millimetres; in fifty seconds, to sixty-nine millimetres. Ten seconds later, exactly one minute after the commencement of the inhalation, the heart stopped, though respiration continued for several seconds.

In Experiment 29 (January 27, 1890) the spinal cord was cut in the extreme upper dorsal region; an inhalation of a mixture containing 66.6 of oxygen and 33.3 of carbonic acid was followed by an immediate fall of the arterial pressure, which fall, in twenty seconds, amounted to seventeen millimetres; in forty seconds, to forty millimetres. After this the pressure began to rise, so that in seventy seconds after the commencement of the inhalation it was twenty-eight millimetres below the norm, and a minute later it was only four millimetres below the norm. At this time the animal was allowed to recover himself and breathe ordinary air for fifteen minutes; at the end of this time the arterial pressure was a little higher than it had been at the beginning of the inhalation. Pure carbonic acid was then given; the fall of pressure was immediate and progressive until death, which occurred in a minute and a half; thus, in twenty seconds, the pressure fell twenty-four millimetres; in forty seconds, forty-nine millimetres; in fifty seconds, seventy-four millimetres.

In Experiment 30, after section of the cord below the first dorsal vertebra, an inhalation was administered containing fifty per cent. of ordinary air and fifty per cent. of carbon dioxide. Immediately after, violent struggles occurred in the anterior portion of the body,

FIG. 10.

EXPERIMENT *A*.—Tracing showing effect of inhalation of carbonized acid gas upon the pulse in normal dog.

EXPERIMENT *B*.—Tracing showing effect upon the pulse after section of vagi.

In conclusion, we believe that our experiments definitely prove that the large slow pulse produced by the inhalation of carbonic acid gas is due to stimulation of the vagi.

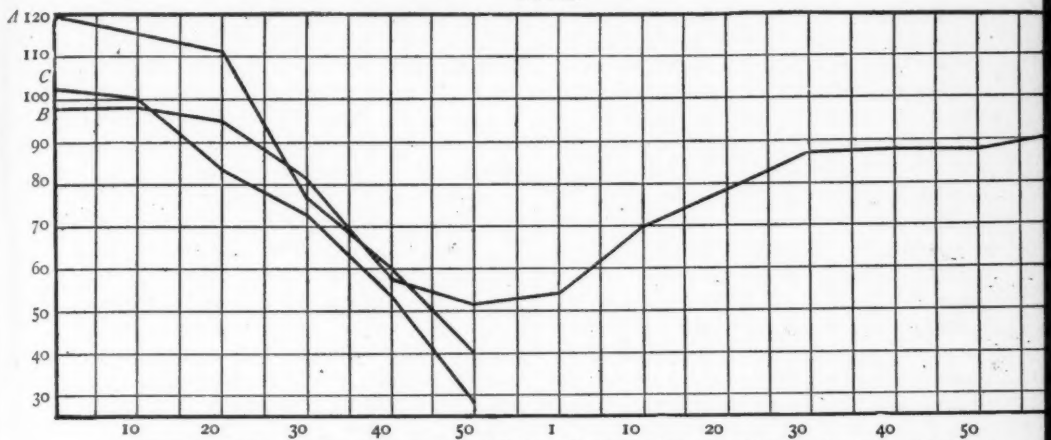
The second series of experiments was made to determine whether the rise of blood-pressure caused by carbonic acid gas is or is not due to an influence upon the vaso-motor system.

In Experiment 28 the cord was cut between the lower cervical and the first dorsal vertebra. Inhalation of a mixture containing fifty per cent. of carbon dioxide and fifty per cent. of oxygen was followed by an immediate fall of arterial

causing the blood-pressure temporarily to rise, so that in fifteen seconds after the beginning of the inhalation it was three millimetres above the norm; a rapid fall then took place, amounting in fifteen seconds to forty-five millimetres, in fifteen seconds more to seventy-four millimetres, in fifteen seconds more to ninety millimetres. After this the pressure, with one temporary exception due to struggles, slowly fell until, four minutes after the beginning of the inhalation, it was one hundred and eighteen millimetres below the norm; thirty seconds later the heart stopped.

The results of these three experiments are diagrammatically shown in the subjoined cuts.

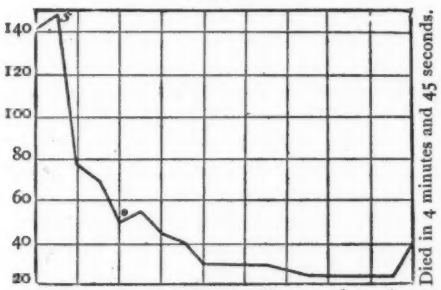
FIG. 11.



EXPERIMENT 29.—Blood-pressure tracings of C_2O and O, after section of spinal cord. *A*, mixture of C_2O and O, fifty per cent. of each. *B*, mixture of C_2O and O, thirty-three per cent. of first and sixty of second. *C*, pure C_2O.

These experiments prove that, after section of the spinal cord, carbonic acid is powerless, even when well diluted, to cause rise of the

FIG. 12.



EXPERIMENT 30.—Cord cut. Mixture of equal parts of air and C_2O. *S*, struggles. ⊙, convulsions.

arterial pressure, and, as a corollary from this, that the rise of the arterial pressure, which is produced in the normal animal by inhalation of diluted carbonic acid, is due to stimulation of the vaso-motor centre in the medulla. The fall of pressure produced by strong carbonic acid is probably due to vaso-motor palsy.

THE VALUES, RELATIONS, AND DANGERS OF THE ANÆSTHETICS.

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DETROIT, MICH.*

(Continued from page 522.)

GERMAN scientists some years since took alarm at the increasing large mortality attending chloroform anæsthesia, and, with their proverbial philosophical and inquiring turn of mind, also set out to settle the truth in their usual excellent manner, by a series of experiments upon lower animals.† It is now nearly four years since Ungar discovered that animals, chloroformed for several hours at a time and upon successive days, showed upon autopsy indubitable evidences of fatty degeneration of: ***First***, the heart and liver; ***second***, kidneys and striped muscular structures; ***third***, gastric and mucous membranes generally. More recently Strassman corroborated these observations, and summed up the result of his researches as follows:

"1. After prolonged chloroformization, in dogs, there can be demonstrated a fatty metamorphosis of the liver; the heart may partake of the same changes as a secondary result. Other organs are seldom affected. The changes consist of true fatty degeneration and not of fatty infiltration.

"2. Subsequent to the usual chloroform narcosis, and when recovery therefrom has apparently taken place, a fatal result is occasionally observed to occur.

"3. Inasmuch as in the fatal cases the heart changes were found to be particularly well marked, these latter may reasonably be assumed to have been the cause of death.

"4. In non-fatal cases the evidences of degenerative changes are not found after several weeks.

"5. These changes are particularly prone to occur in those in whom debilitating influences—such as hunger, loss of blood, etc.—can reasonably account for the susceptibility

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† *Virchow's Archives*, Bd. 115.

to this undue action of the anæsthetic. In young and vigorous animals a greater power of resistance counteracts a tendency to these changes."

These propositions were wholly ignored by the Hyderabad Commission, who made no attempt to verify the observations of either Ungar or Strassman, which, agreeing as they do in all essential particulars, point to but one conclusion,—viz., that the charges brought against chloroform by its earlier opponents are more than sustained; for whereas it was hitherto supposed that the accidents during the administration were due to influences of a more or less functional character, it now transpires that, in addition to what has been regarded either as a paralysis of the heart-muscle, through interrupted nerve-force or overstimulation of the inhibitory apparatus, or both, we are to expect true organic changes in the structure of the heart itself.

We are further indebted to the Hyderabad Commission itself for more precise knowledge of another danger pertaining to chloroform,—viz., the importance of the part played by vaso-motor paralysis in the causation of death. If we accept the report without reserve that chloroform has no power of paralyzing the heart, we have one danger removed, only to be replaced by another equally as great in every respect,—viz., *paralysis of the vaso-motor centre.* This, it is admitted, may set in suddenly and without warning; is as unremediable as cardiac paralysis and equally as fatal. "When death occurs from vaso-motor paralysis," says Professor Alexander Wilson, "it is clearly imaginable that the vaso-motor centre may be hopelessly damaged, or rapidly reaching that stage while the pulse is still present and the heart attempting to keep up the pressure; so that for some seconds there may be a deceptive condition, in which both pulse and respiration are present, yet a fatal termination is imminent." That this death from vaso-motor paralysis does occasionally occur in man is shown by the very rapid running pulse mentioned in some cases as preceding fatal termination.

The deductions to be drawn are obvious, and it cannot be too strongly insisted that the work of the Hyderabad Commission gives us no greater (but rather less) confidence in chloroform than we had before. Even admitting the conclusion formulated,—that it does not cause cardiac paralysis,—this is no safeguard, since it must then much oftener produce a sudden and equally fatal vaso-motor paralysis, with paralysis of respiration superadded. In the mean time, also, the physical and chemical properties of the anæsthetic remain the same, and the danger of permitting a patient to inhale an overdose is as great as ever; and there still remain the same practical difficulties in the way of laying down any decisive rule as to when chloroform shall or shall not be employed. There are, however, certain classes of people with whom it behooves one to be especially upon his guard as regards its administration, notably, confirmed and chronic alcoholics; hysterical, nervous, and excitable personages; rickety and strumous children, especially if subjects of amyloid disease; and patients with feeble and intermittent pulse, who are liable to attacks of syncope. As the excretion of albumen is increased after prolonged chloroform anæsthesia, and (according to Scheede) fatty degeneration of the kidney epithelium may be caused by the employment of mercuric sublimate, I would advise caution in the use of this anæsthetic in connection with antiseptics in albuminuria, especially in cirrhotic kidney.

It will not be imagined, I trust, that the writer would exclude chloroform from the list of anæsthetics. Far from it, as it not only has a place, but a most valuable and in many instances exclusive one, since there are occasions where no other drug can be used to such advantage. Indeed, a study of all the anæsthetics will prove that none are to be wholly condemned or ignored; that while each possesses individual dangers and drawbacks forbidding indiscriminate use, each also embodies individual advantages that can be in no way compensated for.

ETHER.

Ether ($C_4H_{10}O$) has the especial advantage of increasing instead of diminishing arterial pressure, and acts as a stimulant to the heart, which continues to pulsate in fatal cases after the arrest of respiration. The order of involvement of the nerve centres is: The cerebrum, the sensory centres of the cord, the motor centres of the cord, sensory centres of the medulla oblongata, and the motor-centres of the medulla.

As between this drug and chloroform, the following conclusions, as far as they go, seem justifiable, viz.:

1. As an anæsthetic for surgical purposes purely, ether will be found more generally applicable and less dangerous.

2. Chloroform is the preferable agent if

anæsthesia is frequently required in the same individual.

3. As a rule, young and vigorous persons, and even those advanced in years who have not been subjected to debilitating influences, or are not the subjects of degenerative disease, may take chloroform with comparative safety; but this is no reason why the same individuals may not take the safer anæsthetic—ether—as well, all other things being equal.

4. In aged persons, suffering from pulmonary affections, the administration may be commenced with chloroform; but, if the operation is long and wearying, ether may oftentimes be substituted with advantage, both to the patient and the anæsthetist.

5. If degenerative disease of the kidneys and heart exist, without pulmonary complications, ether should have the preference always; but if all these conditions coexist, judgment must be exercised as to which has a predominating influence, and the choice made accordingly; and in any event the anæsthetic should be employed with great caution.

6. As already intimated, a climate possessed of uniform high temperature inhibits in some degree the employment of ether as an anæsthetic; yet this has in a measure been overcome by Dr. Edward R. Squibb, of Brooklyn, N. Y., by the manufacture of a stronger product,—*ether fortior*,—especially designed for the use of the anæsthetist, and inclosed in portable air-tight tins of convenient size.

Finally, as a general and universal anæsthetic, most surgeons will be inclined to give the preference to ether, since when properly and understandingly administered, in suitable cases, it is practically without risk. Juillard, in the Geneva clinic, and Dumont,* most emphatically corroborate this and all that has been claimed by the most ardent advocate and supporter of this anæsthetic, and they add that surgical narcosis is frequently secured in two or three minutes. The latter declares that of one hundred and eighty-two ether anæsthesias, in but a single instance, and that an old subject suffering from chronic bronchitis, was there any necessity for anxiety regarding the patient's condition. His conclusions regarding the employment of this agent with persons suffering from pulmonary affections, are entirely in accord with those of American surgeons of extensive experience,—viz., that it must always be a source of more or less anxiety on the part of the administrator. In addition, it may be noted that it is also a rather universally acknowledged fact, that the more acute the lesion of the air-passages, or of the pulmonary structure itself, the greater the danger, while the reverse is true of chloroform.

The facts are, ether stimulates the circulation and also the respiration up to a certain point, which need not be passed if understandingly administered, and this is so easily demonstrated that it must be familiar to any and every one who has ever employed it. Some of our brethren of the British Isles have been inclined to disparage its employment, especially as they regard and stigmatize the procedures attending its use that too commonly obtain in the United States as a "cramming and drenching" method of anæsthesia. It must be admitted, moreover, that this criticism is overtrue, for ether is so generally believed to be a safe agent that it is often employed in the most wholesale and reckless manner. When everything is ready, the inhaler is saturated and crowded down upon the patient's mouth and nose, and there forcibly held, in spite of the struggles of the sufferer, until the desired result is obtained. It is simply a smothering process, most demoralizing to the patient, and disgraceful to the operator, who can plead only ignorance or cruelty. The patient is suddenly choked and strangled with a highly irritating vapor, without being permitted a single whiff of the much-needed oxygen; all the sensations of impending asphyxia are present, and it is little wonder that shock sometimes supervenes. Indeed, it is a miracle that it is not more often made manifest, or that bronchitis and other unpleasant sequelæ do not more frequently follow. Neither is there economy of time or material, as is frequently claimed, as it tends to render the patient resistant, and consequently more difficult to anæsthetize and also to keep anæsthetized after narcosis has begun. It takes but a moment to educate, so to speak, the lungs and respiratory passages, and allow them to empty themselves of residual air by a gradual process of forced expiration; and this encourages the patient to breathe easily, calms his fears, prevents shock, and, moreover, mitigates, even if it does not wholly prevent, reflex muscular spasm and excitement. Then, when the ether vapor has filled the lungs, the inhaler may be pressed close to the face, and anæsthesia quickly follows. By following this latter method, less ether is required, and the boasted superiority of chloroform as to rapidity of action is proven largely delusory.

* *Korrespondenz. f. Schweizer Aertzte*, 1889, No. 23.

I have said that, within limits, ether stimulates respiration. This is true; but, like all other stimulants, when employed for a prolonged period and in large quantities, it becomes a depressant. Therefore, in protracted operations, it is desirable to keep the patient anæsthetized with a minimum expenditure of fluid. To do this is an art, attained only by knowledge and experience, and, once mastered, it is surprising what a small amount of vapor will continue anæsthesia once begun.

Regarding vomiting, which is such a bugbear to some, I can only say that if the patient has partaken of a minimum of some bland food but a short time prior to the operation, nausea is not likely to supervene, but may follow upon partial return to consciousness; and even this may to great extent be controlled by first administering hypodermically a minimum dose of morphine muriate. It should be remembered that an empty stomach is as undesirable as a full one, and apt to be even more distressing as regards subsequent nausea. It has been suggested that a mixture of nitrous oxide and ether would do away with the unpleasant after-effects, but this is not borne out by experience; on the contrary, they are increased. But that ether is more likely to induce nausea and vomiting than chloroform is in the main true, though this in no inconsiderable measure depends upon the way in which the anæsthetic is administered. Out of one hundred and forty-four cases of chloroform and seventy-eight of ether anæsthesia, as conducted at St. Bartholomew's Hospital, London, by Dr. Elliott, fifty-four of the former and thirty-four of the latter had after-sickness; and it is equally true that one does not encounter such aggravated and obstinate sickness after ether as occasionally supervenes from chloroform narcosis.

It is often extremely dangerous to administer ether to the excessively obese or to full-blooded individuals, especially those possessed of an abundance of abdominal fat; and also, for like reasons in part, to alcoholics. Other cases not suitable are: Children and old people; operations wherein a flame or cautery must be brought in close proximity to the face; operations about the face; patients with well-marked bronchial affection. One objection also made regarding this anæsthetic—viz., the production of an abundant secretion of pharyngeal mucus (sometimes so excessive as to cause a serious obstacle to respiration by collecting about the aperture of the pharynx)—is easily overcome by closing the mouth,—by lifting the lower jaw,—when the accumulation passes into the œsophagus, and thence to the stomach.

The instances wherein chloroform may sometimes be preferable to ether are:

1. Children, because heart lesions are rare in childhood, or, when present, are pronounced, and every other organ is healthy or supposed to be; further, it requires no apparatus that excites fear, and, moreover, may at first be given so insidiously as to establish partial anæsthesia without the knowledge of the little patient. Ether, on the contrary, is alarming, both from its vapor and the course necessarily employed, and is irritating to the delicate bronchial mucous membrane, while the cold produced may cause an attack of acute bronchitis or pneumonia.

2. Old people, who, as a rule, take chloroform extremely well, especially if given by means of the drop-bottle and a single thickness of lint, the latter held in the shape of a dome over the nose.

3. Operations about the face, or where the cautery or a light is employed in close proximity to the latter.

4. Cases where there is any lung affection. Those of the pleura, however, do not contraindicate ether as a rule, if understandingly administered. Although chloroform may be in some degree a pulmonary depressant, it is preferable to ether, in spite of the antithetical action of the latter, for reasons obvious and already embodied.

5. Mitral disease with pulmonary engorgement; the same arguments as in 4 here hold good in part.

6. Where absolute muscular relaxation is required, as for diagnosis of tumors, or luxations of hip or shoulder-joints, etc.

7. In some abdominal operations, notably herniotomy, where coughing is to be avoided.

8. In cases where venous engorgement is a decided advantage, as in ligatures of the large arteries, for example, ligations of the carotids or subclavian.

9. Very fat people.

ETHYL BROMIDE (C_2H_5Br) AND ETHYL CHLORIDE (C_2H_5Cl).

The climatic objections that obtain to ether are in no small way applicable to these two products. Neither have, however, seemingly found any great favor with the great majority of anæsthetists, probably because their physiological action is yet a matter of some uncertainty.

Ethyl bromide presents many advantages for brief operations, not the least among which are economy of material and rapid anæsthesia, two drachms usually being sufficient to cause insensibility, and often but half the quantity. The effect rapidly passes off, and, so far as personal experience is concerned (in which I am corroborated by Dr. Robert Farquharson, of Edinburgh, and Dr. Woodbury, of Philadelphia), it does not seem to physiologically depress either the heart or pulmonary apparatus. Farquharson says,* "When the chemically pure drug is used, it has been found to answer the purpose of an anæsthetic, being safer than chloroform and more pleasant than ether."

Dr. Ivan N. Drakin† highly recommends bromide of ethyl as eminently suitable for all operations of under fifteen minutes' duration, the recommendation being based upon personal administration in two hundred cases. He administers from an ordinary inhalatory mask, the average dose required to produce narcosis being about one-fourth ounce; complete anæsthesia follows within one minute, and lasts about a quarter of an hour. The following essential advantages in comparison with other anæsthetics are claimed:

1. While paralyzing pathic sensibility, it leaves the tactile sense intact, and does not affect consciousness to any considerable degree.

2. The pulse and respiration, as well as muscular tone, remain unaltered.

3. Vomiting occurs but very seldom (twice in two hundred cases).

4. Recovery from anæsthesia is rapid, easy, and spontaneous.

5. Anæsthesia is not accompanied by any unpleasant accessory phenomena, except in habitual drinkers and hysterical persons, in whom recovery is followed now and then by some fleeting and slight excitement.

6. No assistants are needed.

7. It is an entirely safe and harmless anæsthetic, provided an absolutely pure drug is used; injurious preparations, inactive as anæsthetics, may give rise to disagreeable and even dangerous accessory effects.

In the hands of the writer, bromide of ethyl has proved alike satisfactory to patient and operator on numerous occasions; and though several deaths are reported to have followed its administration, such are so vaguely and imperfectly given, that one is justified in doubting if the anæsthesia was an active factor therein. However, Dr. William Whitla (of the Belfast Royal Hospital, Ireland) declares its action upon the heart and respiration to be "the same as that of chloroform, from which it differs only in the rapidity of its action (two or three minutes) and the promptness with which patients come from under its influence; it certainly cannot be said to be less dangerous than chloroform, from the trials already made, and it must be still less free from danger than ether."‡

Ethyl chloride, or *ethylene bichloride*, which closely resembles the bromide in physical attributes, has been highly recommended by Dr. Snow, and was likewise made the subject of very careful experiments by a committee appointed by the British Medical Association. They report it as occupying an intermediate position as regards ether and chloroform, being more dangerous than the former, but less so than the latter; that it is more pleasant than chloroform, and much less exciting in the early and after stages; and recovery from its influence is more rapid than in the case of ether. However, Ringer most positively asserts it is equally poisonous to the heart with chloroform. The vapor of half an ounce is usually sufficient to produce anæsthesia in the adult. A decided hinderance to its employment obtains from the fact that it has been observed that opacity of the cornea sometimes follows, owing to its power of dehydrating corneal tissue. Personally, I have had no experience therewith, but Dr. Clover advocates its use in minor surgery, employing after the previous production of insensibility by nitrous oxide.

METHYLENE, OR METHYLENE BICHLORIDE.

Methylene bichloride ($C_2H_2Cl_2$ or CH_2Cl_2) is a thin colorless fluid, of a specific gravity of 1.34, closely resembling chloroform in general appearance and smell, originally introduced by Dr. Richardson in 1867. The following is a summary of his researches:§

"1. It is an effective general anæsthetic, producing as deep insensibility as chloroform.

"2. Its action is rather more rapid than chloroform, but to develop its effects more is required, in the proportion of 6 parts to 4.

"3 It produces a less prolonged second degree of narcotism than other anæsthetics.

"4. When its effects are fully developed,

* "Therapeutics and Materia Medica."

† *Novosti Terapii*, 1889, No. 38.

‡ "Pharmacy, Materia Medica, and Therapeutics."

§ *Medical Times and Gazette*, November 2, 1867.

the narcotism is very prolonged, and is reproduced with great ease.

"5. Its influence on the nervous centres is uniform, and it creates little if any disturbance or break of action between the respiratory and circulating functions.

"6. Its final escape from the organism is rapid, so that the symptoms of recovery are sudden.

"7. In some cases it produces vomiting.

"8. Where it kills, it destroys, by equally paralyzing, the respiratory and circulating mechanisms.

"9. It interferes less with muscular irritability than perhaps any other anæsthetic.

"10. It combines with ether and chloroform in all proportions."

Methylene is prepared by acting upon chloroform with nascent hydrogen, and its vapor, unlike that of chloroform, is highly inflammable; further, being very volatile, it is hard to preserve, except in the dark in well-stoppered bottles immersed in water.

Dr. Morgan* claims that "it is safer, more rapid, more manageable, and more easily recovered from than chloroform. Two minutes commonly suffice to establish anæsthesia, and two drachms given in the same way as chloroform is amply sufficient." It has been given by him eighteen hundred times without a single untoward result, and but nine fatal cases all told have ever been reported by others, and some of these are open to suspicion as to the drug being the cause of death. It is found by ovariotomists to be more manageable than either chloroform or ether; consequently it obtains the preference for operations within the abdominal walls. Sir Spencer Wells has repeatedly sung its praises, and in his "Address on Surgery," before the British Medical Association at Manchester, 1877, said,—†

"Given perfectly diluted with air, the vapor has, in my experience of more than ten years, with more than one thousand operations of a nature unusually severe as tests of an anæsthetic, proved, without a single exception, applicable to every patient, perfectly certain to procure complete anæsthesia, relieving the surgeon of all alarm or even anxiety, and its use has never been followed by any dangerous symptoms which would be fairly attributed to it.

"I wish I could speak as confidently of the chemical composition of the fluid sold as bichloride of methylene as I can of its anæsthetic properties. But whatever may be its chemical composition, whether it is or is not chloroform mixed with some spirit or ether, or whether it is really bichloride of methylene, I am still content with the effects of the liquid sold under that name when properly administered."

And again he adds:‡

"And more than another ten years has confirmed me in the opinions expressed (referring to the foregoing). Professor Tyndall told me that no chemist could make pure bichloride of methylene under ten shillings an ounce, and that when made it would not keep a week. Others said a mixture of chloroform and methylic alcohol would act as well, but on trial it did not, neither did the 'A.-C.-E. mixture' or Reidel's methylene. Last week Dr. Day gave the latter for me in a case of amputation of the breast. The tube of Junker's apparatus became so choked with snow before I began the operation that the patient could not be made unconscious, and we had to give chloroform, neither of us very willingly.

"Accordingly, until some new anæsthetic is brought forward, I shall remain content with the bichloride of methylene, made as first proposed by Dr. Richardson. I have never known it to fail, and I have never once been alarmed, or even made uneasy, by its effects in any one of more than two thousand operations, many of them of unusual severity of duration."

Mr. Rendel§ gives an account of one hundred and twenty-three cases, containing many points of interest, of which the following is an abridged analysis:

"The ages of the patients varied from 6 months to 70 years. Anæsthesia was produced in thirty seconds in eighteen cases; in sixty seconds in seventy cases; in two minutes in twenty-five; in three minutes in five; in five minutes in three; in nine minutes in two. It was maintained one minute in twenty; two minutes in thirty-one; three minutes in nineteen; four minutes in fourteen; five minutes in eleven; six to ten minutes in ten. Less than one fluidrachm was employed in sixteen; additional two to four drachms in thirteen. Fifty recovered within one minute; twenty-three in two minutes; nine in three minutes; twenty-eight in five minutes; eleven in ten minutes;

* *British Medical Journal*, October 16, 1869.

† Ibid., September, 1877.

‡ Ibid., June 9, 1888.

§ Waring's "Therapeutics."

two were continued with chloroform. Vomiting occurred in fifteen,—*i.e.*, one in eight,—but in all these the anæsthetic was continued more than two minutes, and in nine more than a drachm was used; some also had partaken of food just prior to employment of methylene. Three female adults and one child became somewhat cyanosed, with the pulse slower than normal, but on removal of the inhaler and by turning slowly on the left side, they recovered."

From the foregoing, we may well imagine that this anæsthetic is too much neglected by surgeons generally, and that it especially deserves more attention and study than has hitherto been given it on the American side of the Atlantic. There is, however, some reason for this, as may be gathered from the remarks of Sir Spencer Wells. Professors Genther and Eichholz, of Germany, assert the rather startling fact that ordinary methylene bichloride, as found in the shops, is nothing but a mixture of 1 part of this drug with 4 parts of chloroform; and Gutzart maintains that, as prepared by the old process, nothing else is possible. However, the remarks embodied in this paper refer solely to methylene as originally prepared by Dr. Richardson.

NITROUS OXIDE.

Of late the protoxide of nitrogen (NO = 22), so long in favor with the dental profession, has received considerable attention at the hands of anæsthetists. Prominent among these, and perhaps the earliest advocates for its employment in general surgery, are Mr. C. J. Fox* and Mr. R. Rendel,† who assign the following reasons for their preference: "Because of its safety and the rapidity with which anæsthesia can be induced,—fifty to one hundred seconds; the readiness with which the patient can be kept for a long period in the anæsthetic state, or, if necessary, can be promptly and thoroughly awakened. Because it is pleasant to inhale, and therefore much fright and mental disease are avoided, diminishing the danger of death by syncope. Because recovery is usually bright, pleasant, and complete, any after-discomfort being very rare. Because sickness is exceedingly infrequent, either during administration or subsequently."

However, the method by which the gas induces anæsthesia—*i.e.*, the exact physiological processes that take place—are matters of considerable doubt. It is, nevertheless, certain that it affects cerebral centres and not the peripheries, and that it is not, as has generally been supposed, decomposed in the system. Joylet and Blanche (*vide* Whitla)‡ affirm that it has no effect whatever upon the system save that of the deprivation of oxygen; and it is stated that, save exhilaration, the same result is obtainable with pure nitrogen or by asphyxia.§

Recently Dr. Frederick Hewitt elaborately discussed the supposed advantages resulting from the use of nitrous oxide alone, or in combination with oxygen, and when mixed with the vapor of ether.‖ He would employ the gas alone—

1. For minor operations,—such as tooth extraction, opening of abscesses, incisions of whitlows, etc.,—with the expectation of securing sufficient anæsthesia in not more than thirty seconds.

2. In the slitting up of sinuses, avulsion of toe-nails, temporary applications of the actual cautery, and operations of this class, he would employ nitrous oxide alternately with oxygen, in the expectation of securing insensibility in one minute.

3. For rectal, vaginal, and urethral operations, breaking up of adhesions of joints, certain dental operations, removal of post-nasal adenoids, and kindred surgical procedures, a mixture of nitrogen protoxide and ether vapor is advised.

There are certain exceptions, however, to be noted in Classes 1 and 2,—viz., (*a*) nasal and oral operations likely to be accompanied

* *Lancet* (London), April 2, 1870.

† *British Medical Journal*, October 16, 1869.

‡ "Materia Medica and Therapeutics."

§ Dr. Buxton, in a paper read before the British Dental Association in August last, denied the asphyxiant properties of nitrous oxide, whereupon Mr. John Elliott, anæsthetist to St. Bartholomew's Hospital, London, remarked: "The assertion that nitrous oxide is no asphyxiant is calculated, I think, to raise the spirit of opposition. Those who have watched the increasing lividity, labored respiration, jactitation, and muscular twitching of nitrous oxide narcosis, will acknowledge that they bear a suspicious resemblance to the phenomena of asphyxia; while Dr. Buxton's own account of the appearance of the brain, of the fulness of the hemispheres, and the purple appearance of the surface, in his experiments on anæsthetized animals, lends color to this view. We are told also that during nitrous oxide administration there is a general fall of blood-pressure,—a fall which is most marked in the splanchnic area. This seems difficult to reconcile with the observed fulness of the brain and spinal cord and overflow of cerebro-spinal fluid, especially when respiration is artificially kept at a normal standard in a curarized animal."—*Birmingham Medical Review*, February, 1890.

‖ *British Medical Journal*, October 5, 1889.

with hemorrhage; and (*b*) operations requiring perfect quietude and total muscular relaxation,—for although nitrous oxide narcosis may be unattended by reflex movement, jactitation, and rigidity, these phenomena are liable to manifest themselves, more especially in strongly-built men, highly nervous and hysterical subjects, alcoholics, habitual smokers, children, and those undergoing operations upon the genito-urinary passages.

In Class 3 should be excepted, also for obvious reasons,—(*c*) all operations within the upper air-passages where the actual cautery is employed. Some years since, during the ether-chloroform controversy, a patient in the Massachusetts General Hospital died from neglect of this precaution, the cautery igniting the pulmonary exhalations. This properly might be termed a death from ether; but the acrimony displayed in the aforesaid controversy led to suppression of the facts, and fatality was ascribed to "*bronchitis.*"

In general, also, nitrous oxide, or any admixture thereof, is undesirable or inadmissible in—(*d*) children under 3 years of age; (*e*) patients suffering from renal disease or pleural, pulmonary, or other conditions attended by embarrassed respiration; (*f*) extreme asthenia; (*g*) collapse.

The preference in *a* and *b* is expressed for nitrous oxide, with a small quantity of ether. In *c*, for nitrous oxide administered intermittently with air, or for chloroform either alone or diluted with alcohol, the latter to be employed when the actual cautery is used. In many of these cases Dr. Hewitt deems it desirable to give gas and ether to deep etherization, and, in the event of the operation being prolonged, to finish under chloroform, or chloroform and alcohol. Chloroform is also deemed the best anæsthetic in all prolonged operations in the mouth or nose; all operations in which venous engorgement would constitute a difficulty or danger; in abdominal surgery; all conditions causing such narrowing of the upper air-passages as to produce temporary or abiding difficulty in breathing; affections of the lung or pleura attended by cyanosis or dyspnœa, marked atheroma, and advanced renal disease.

For *d* and *e*, for excision of tonsils, cases intolerant of ether, old people over 60, extremely fat subjects, those suffering from affections of the air-passages or pleura with but slight embarrassment to respiration, morbus cordis with feeble or irregular heart action including fatty degeneration, extreme abdominal distention, in all is recommended a mixture of alcohol, chloroform, and ether.

In collapse of extreme asthenia—for example, neglected, strangulated hernia—the preference is given to pure ethylic ether, sparingly administered from a towel cone.

The anæsthetic recommended for the lying-in room (and also during the passage of renal calculi) is the alcohol-chloroform-ether mixture, or chloric ether; but where forceps are employed, ether *solus*.

That ether is preferable to chloroform for forceps delivery, or the "A.-C.-E. mixture" to chloroform alone in any stage of labor, will scarcely be accepted by the majority of obstetricians. Death from chloroform in such cases is positively unknown, and it alone perfectly fulfils the conditions of rapidity of action and lack of unpleasant odor. Moreover, post-partum hemorrhage is less apt to follow the use of this anæsthetic than ether, ethyl, methyl, or the triple mixture.

As regards the "A.-C.-E." combination, it is a mystery how, in these days of enlightenment, it obtains popularity, or how it secured the endorsement of a joint committee of the Royal Colleges of Surgeons and Physicians. Given with plenty of air, and under the other conditions demanded by chloroform, it invariably gives the typical trace of the latter, proving that it is to chloroform chiefly that it owes its anæsthetic influence. If administered freely, it frequently produces very rapid and dangerous fall of blood-pressure, such as has been observed from chloric ether. It is, then, simply a *dilute chloroform*, and by no means the best dilution; and, moreover, it is an unchemical, unphysiological, and every way unscientific combination. Whatever there may be of either good or evil that pertains to chloroform, ether, or alcohol, should be kept apart; and the habit of uniting the one, and at the same time attempting to prevent the undue influence of the other, must always remain a matter of uncertainty and doubt, especially since ether and chloroform are physiologically antagonistic. The danger to respiration and heart's action would be doubled but for this; and, in fact, the danger of cardiac arrest is enhanced. This has been proven by Ellis, Juillard, and Dumont, and later by Ungar.

The apparatus demanded for the administration of nitrous oxide is a disadvantage if the anæsthetic is to be employed away from the office or hospital, and the same objection obtains to the combination of gas and ether vapor. The recent modification of Clover's

apparatus, as designed by J. Frederick Silk,* however, apparently does away in great measure with these objections, being comparatively portable and easy of management.

In a discussion before the Brooklyn (N. Y.) Surgical Society, June 6, 1889, Dr. George R. Fowler remarks:† "For operations on the perineum or within the abdominal cavity, or where the patient must be thoroughly relaxed, I think nitrous oxide is not to be depended upon, though why is not exactly known. One patient will be almost suffocated; his condition appears to be alarming; and although apparently anæsthetized, yet a peculiar rigidity of the limbs would prevent an operation,—say for hemorrhoids, for instance. On the other hand, I call to mind an occasion where Dr. Brush most successfully administered nitrous oxide for me in a case of laryngectomy, the anæsthesia proving all that could be desired. The patient was under its influence during the removal of the larynx,—a period of time covering one hour and forty minutes. I think in about three minutes from the time the tube was removed, through which the anæsthetic was given, the patient rose up on the table and looked about wonderingly, and, had she been allowed, would have walked to her room. It was a perfect revelation to me. I had never dreamed that it could be accomplished, and when I rather hesitatingly gave my consent that nitrous oxide should be administered, it was with a great many misgivings."

Dr. Geo. W. Brush, the anæsthetist in question, added: "I have had quite a little experience for the last ten years with this anæsthetic, and have come to the conclusion that it is like all other anæsthetics,—it cannot always be depended upon. Once in a while we come across a case where it cannot be used, and therefore I have adopted the habit, in going to any case to anæsthetize with nitrous oxide, of taking the three anæsthetics along, and if the patient does not come under the gas readily for the prolonged effect, I substitute ether or chloroform, as seems best. But ordinarily, or in the majority of cases, if it is desired to give it for prolonged operations, it can be done. I gave it in one operation for stone, and the operation was forty minutes. The patient was thoroughly anæsthetized, and was practically recovered from it before he could be gotten in bed. . . . But, as I have said, there will occasionally be a patient who will manifest some unpleasant symptoms for the operator, such as rigidity or unsteadiness, and occasionally (though this is rare) a case where anæsthesia is not complete. . . . But experience leads me to the opinion that where nitrous oxide can be used in surgery, it is safer and pleasanter for the patient, economizes the time of the operator, and anæsthesia can be maintained almost indefinitely if there is proper care on the part of the administrator, the patient being in better condition when the operation is over than if ether or chloroform had been used."

The wide-spread belief in the utter inoccuousness of nitrous oxide; the fact that the shock liable to result where ether or chloroform are the anæsthetic agents is wanting; the absence of irritating qualities, as well as of taste and smell; and the ease of its administration when armed with proper apparatus, are certainly attractive features, and lead to the surmise that this agent is deserving of more extended trial by surgeons.

There are, however, several drawbacks: The time and trouble required in preparation; its bulk and non-portability, even when compressed into iron cylinders; the complex apparatus necessary for its administration; its tendency to *produce somewhat intractable glycosuria;* unsuitability to certain cases, especially when muscular relaxation is required; the fact that, like all gases, it remains gaseous at the temperature of the blood and does not condense when introduced into it; and last, but by no means least, the ghastly cyanosis induced along with the appearance of impending suffocation which nearly all patients exhibit, and which naturally lead to the belief that carbonic dioxide accumulates in the circulation. This last in the patient above referred to by Dr. Fowler was "present all the time," and he declares‡ that it was "all he could do" to preserve his equanimity during this trying time. "In spite of Dr. Brush's assurances, I felt far from comfortable, and whatever credit my colleagues, who witnessed the operation, may be inclined to give me for its successful completion, they will never know how much I was handicapped by that ashen-gray, death-like, upturned face, within a few inches of my own, during the whole time. . . . It was small comfort to know that one's patient was not being suffocated with one agent, while the suggestion was constantly before one's eyes that either that or something else was threatening to sus-

* *British Medical Journal*, January 18, 1890.

† *Brooklyn Medical Journal*, November, 1889, p. 709.

‡ Ibid., February, 1890, p. 70.

pend animation or destroy life. Dr. Brush's assertion that 'they always look badly' under its influence is somewhat reassuring, but his suggestion that the appearances are due to some chemical changes in the blood itself only leads one to dread the possibility of there being some ultimate, if not immediate, danger resulting from its administration. Chemical conditions which could produce such changes in the circulating medium, even temporarily, are not to be disregarded."

With regard to this somewhat anomalous state of apparently threatened death and yet assured safety, Ulbrich, who employed the spectroscope for the purpose of determining the relation which nitrous oxide bears to the blood during administration, declares there is chemical union between nitrous oxide and the hæmoglobin. However, this observation has not been confirmed, neither has it been shown that this union could be of a character that would not destroy or even temporarily abrogate the function of the hæmoglobin. Preyer, Buxton, and MacMunn have made similar spectroscopic experiments, but without arriving at any definite or satisfactory conclusion. But Rothman, who severely criticised Ulbrich, claims to have established as a fact, that blood saturated with nitrogen protoxide possesses exactly the same spectrum as oxyhæmoglobinic blood. If this is true it is a point of incalculable advantage, since it proves that the hæmoglobin is enabled to continue its function in spite of the presence of the gas in the circulation, and hence no harm can result from the prolonged administration of the anæsthetic. Upon suspending the inhalation, the processes of oxidation are at once resumed by the admission of atmospheric air to the respiratory apparatus.

Another source of decided inconvenience to the use of nitrous oxide, and that debars its employment at night and in specific cases, is the altered color of the blood as it issues from the divided arteries, rendering it difficult, and sometimes impossible, to distinguish from venous and capillary oozing. An arterial twig may, for several reasons, not always give off a *per saltum* stream, and yet afford sufficient blood to seriously embarrass the operator and to require a ligature; and while slight pressure or hot water may suffice to control capillary hemorrhage, it is sheer waste of time to resort to such methods in case the flow is arterial.

A point worthy of recollection is mentioned by Dr. Fowler in connection with a case in which he desired to remove a portion of the lower jaw for necrosis. It was found impossible to bring the patient under its influence, when ether was substituted. "But, either from the previous efforts with the nitrous oxide or from some peculiar idiosyncrasy on the part of the patient, it was impossible to control the powerful efforts at resistance without exerting undue force." He was finally compelled to substitute chloroform, under which the operation was brought to a satisfactory conclusion.

The peculiar condition of muscular rigidity which sometimes supervenes is not at all relieved by pushing the anæsthetic, as is the case with ether, chloroform, and methylene; on the contrary, it rather increases as narcosis deepens, until it sometimes extends to the muscles of respiration, which, of course, would demand instant cessation of further attempts towards anæsthesia with this agent. Even the combination with ether vapor does not overcome these defects; and this rigid condition, of course, precludes the use of nitrous oxide for operations about the anus, rectum, perineum, or elsewhere when a relaxed condition is necessary or desirable.

Arguing from his view of the absence of pulmonary engorgement, Dr. Buxton, in an essay read before the British Dental Association at Brighton in August last, made the statement that there is no ordinary intra-pleural or intra-pulmonary condition which should, in his experience, contraindicate the use of nitrous oxide. This, however, is at variance with the experience of most anæsthetists. Dr. John Elliott, of St. Bartholomew's Hospital, London,* whose experience is inferior to none, remarks that the only instance in which he ever saw really alarming symptoms follow nitrous oxide anæsthesia was a case in which a slight pneumonia was present; nevertheless, he would not venture to employ it when there is any active morbid condition of either lung or pleura.

Cases also of mitral disease, with tendency to pulmonary engorgement, should, I think, be considered unfit for the administration of gas. And it is contraindicated, or, at least, should be administered with extreme care, in anæmic persons (especially young girls), those with feeble and intermittent pulse, and old and feeble individuals. It has been said also that nitrous oxide is inadmissible for young children, though on what ground, other than the fear inspired by the apparatus

* *Birmingham Medical Review*, February, 1890, p. 67.

demanded for administration, I cannot imagine. Dr. Elliott (just quoted) declares that he has given it repeatedly, and found that they "take it extremely well."

Recently Dr. George W. Brush, of Brooklyn, N. Y., has been experimenting upon animals with a mixture of nitrous oxide and chloroform vapor, but has not as yet arrived at any very definite conclusion, though he thinks the indications point to a very safe anæsthetic. It seems to act as a stimulus, and overcomes the depression that occurs when the latter agent alone is employed.

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THE TREATMENT OF THE MORPHINE-DISEASE.

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THREE methods obtain in the treatment of this disorder,—the slow method, the abrupt method, the rapid method. Each has its advocates, and under some conditions each its advantages.

A consideration of the first and second need not here detain us, the object of this paper being to invite attention to a plan of treatment original with the writer, and practised by him for several years with increasing satisfaction and success. It is a more or less happy mean between two extremes,—avoiding the painful ordeal of abrupt disusing or the tiresome delay of prolonged decrease.

Tersely stated, it may be said that this disease involves the cerebro-spinal and sympathetic systems, well-attested clinical facts proving that they bear the brunt of opium excess, which induces changes that give rise to great nervous derangement when the opiate is abruptly withdrawn, and which, in gradual withdrawal, is seldom entirely avoided.

The aches, pains, yawning, sneezing, shivering, nausea, vomiting, diarrhœa, restlessness, delirium, convulsions, exhaustion, collapse, incident to sudden opiate-quitting, are reflex indications of great irritation in those centres, and any treatment having the power to counteract and control this condition must contribute vastly to the patient's comfort and cure.

The method we commend is based on the power of certain remedial resources to subdue abnormal reflex action, and secures largely two cardinal objects,—minimum duration of treatment and maximum freedom from pain. It consists in producing a certain degree of nervous sedation, and consequent control of reflex irritation, by means of the bromides, though we refer specifically to the *bromide of sodium*, having used that exclusively in cases under our care. This is merely a new application of a well-established principle, for the power of the bromides to subdue abnormal reflex irritability is so constant that it may be looked upon as an almost certain sequel of such medication. Dr. Edward H. Clarke, in his valuable treatise on the bromides, says, "Diminished reflex sensibility, however different physiologists may explain the fact, is one of the most frequent phenomena of bromidal medication that has been clinically observed, and is, therapeutically, one of the most important." And the evidence of other observers—Gubler, Guttman, Laborde, Voison, Damourette, Eulenberg, Claude-Bernard, Brown-Séquard, and Echeverria—is to the same effect.

In speaking of the bromide of sodium let it be understood that we refer entirely to the influence of the *continued dose*, by which we mean giving it twice in the twenty-four hours, at regular intervals, so as to keep the blood constantly charged with the drug. A most important difference exists between the effect of this mode of using and that of the single dose, or two or three doses so nearly together as to form practically one, for in the former case the system is constantly under the bromide influence, while in the other, the drug being eliminated in a few hours, it is nearly free a large portion of the time. Results obtainable from continued use cannot be gotten from the single dose, and so its value is far greater in this condition.

Again, the action of the continued dose being somewhat remote,—four to six days usually elapsing before there is decided evidence in this direction,—much more desirable results are secured by its employment for several days *prior* to complete opium-quitting, meanwhile gradually reducing the opiate, than if the withdrawal be abrupt and then reliance placed on the bromide; for, in the former, the maximum sedative effect is secured at the time of maximum nervous disturbance from the opium removal, and its counteracting and controlling power is far in excess of that to be had from its taking after the lighting up of the nervous irritation. What, then, we term *preliminary sedation* forms an *original* feature in our giving of the bro-

* Member of the American Association for the Cure of Inebriates; of the New York Neurological Society; of the Medical Society of the County of Kings.

mide, and it is this special point we commend, our experience having convinced us that we have in it a very valuable means of lessening discomfort incident to the treatment of this disorder.

The value of the various bromides depends on their proportion of bromine. Bromide of potassium contains sixty-six per cent., sodium seventy-three, and lithium ninety-two per cent. We should, therefore, expect a more powerful influence from the last drug, and, according to S. Weir Mitchell, it has a more rapid and intense effect. The sodium, however, answers every purpose, and has several points in its favor over other bromides,—is pleasanter to the taste, more acceptable to the stomach, causes little cutaneous irritation, and much less muscular prostration. In this connection, experiments by Drs. Ringer and Sainsbury on the superior value of the sodium salt are of interest, and may be found in the *British Medical Journal*, March 24, 1883.

Either of the bromides, in powder or strong solution, is somewhat irritant, sometimes causing emesis, and in any event delaying absorption. A practical point, then, is that it be given largely diluted. Dr. Clarke says, "There should be at least a drachm of water to each grain of the salt." We give each dose of the sodium with six or eight ounces of cold, iced, carbonized, or lemonized water, and have never known it to disagree.

To secure the requisite degree of sedation within a limited time, it is essential that the bromide be given in full doses. Failure from its use, in any neurosis, is often due, we think, to a non-observance of this point. Our initial dose of the sodium is 30 grains, twice daily, at twelve hours' intervals, increasing the amount 20 grains each day,—*i.e.*, 40, 50, 60 grains,—and continuing it, in proper cases, eight to ten days, reaching a maximum dose of 100 to 120 grains twice in twenty-four hours. During this time of bromidal medication the usual opiate is gradually lessened, so that from the eighth to the tenth day it is entirely abandoned. A decrease of one-quarter or one-third the usual daily quantity is made at the outset, experience having proved that *habitués* are almost always using an amount in excess of their actual need, and this reduction causes little or no discomfort. Later, the opiate withdrawal is more or less rapid, according to the increasing sedation, the object being to meet and overcome the rising nervous disturbance by the growing effect of the sedative; in other words, maximum sedation at time of maximum irritation.

Exceptions to this may occur. Some patients are so weak and anæmic on coming that a previous tonic course is deemed judicious; the usual opiate is continued for a time, and, meanwhile, by full food, tonics, and other measures, effort is made to improve the impaired condition, and with success, for we have seen patients gain markedly in strength and weight during this roborant *régime*. Sometimes a patient, before placing himself under our care, has reduced his daily taking to the lowest amount consistent with his comfort. If so, the initial large reduction is not made, but the decrease is gradual throughout. Again, in some cases, no reduction is made for two or three days, when the bromide effect is secured in part, and the decrease is then begun. And with all patients this rule governs: *each case is a law unto itself, and the length and amount of the bromide-giving and consequent rate of opiate decrease is determined entirely by individual peculiarity, as shown both before and during treatment.*

Surprise may be expressed and objection made regarding the extent of the bromide doses, but the fact must never be overlooked that we are not to be governed in the giving of any remedy by mere drops or grains, but by the *effect produced*. Again, one result of opium addiction is a peculiar non-susceptibility to the action of other nervines, necessitating their more robust giving to secure a decided effect. More, under the influence of certain abnormal conditions, doses which ordinarily are toxic become simply therapeutic. Medical annals abound with such cases, and among the most striking may be noted the following: Dr. Southey read before the London Clinical Society notes of a case of tetanus in a boy 10 years old. The first symptoms were observed two days after a severe fright and drenching, due to the upsetting of a water-butt. They steadily increased up to the date of his admission to St. Bartholomew's Hospital, on the eighth day of his illness, when the paroxysms of general opisthotonos seized him at intervals of nearly every three minutes. Each attack lasted from fifteen to thirty seconds, and although between the seizures the muscles of the trunk became less rigid, those of the neck and jaw were maintained in constant cramp. The patient was treated at first with chloral, ten grains, and bromide of potassium, twenty grains, every two hours, and afterwards with the bromide alone in 60-grain doses every hour and a half. When about two ounces were

taken in twenty-four hours the attacks became less frequent, but at first each separate seizure was rather more severe, and on the evening of the eleventh day he was able to open his mouth better. On the thirteenth day the bromide was decreased to 20 grains every three hours, and on the fourteenth day was discontinued. When it had been omitted twenty-four hours the attacks returned at intervals of an hour, and the permanent rigidity of the neck muscles was re-established. His condition now steadily became worse, so that on the eighteenth day of his illness it became necessary to resort to the previous large doses,—1 drachm every hour and a half. After three such doses the expression became more natural and he was able to open his mouth again, but it was not until the twenty-fifth day of his disease that it was possible to discontinue the remedy. The patient remained in a state of remarkable prostration and drowsiness, sleeping the twenty-four hours round, and only waking to take his food for eight days, and passed all his evacuations under him. He subsequently rapidly and steadily convalesced. The bromide caused no acne or other unpleasant effect, and certainly seemed to exert a markedly controlling effect on the tetanus.

Given as we commend, no effect is usually noted before the fifth or sixth day. Then patients often mark an increasing drowsiness, which deepens into slumber more or less profound, so much so at times that it is difficult to remain long awake. With this is an aversion to exercise, not solely due to lessened muscle force, but largely to mental hebetude. Some cases are met with in which the hypnotic effect is not very decided, but the rule is as stated. Sometimes a saline taste and increased saliva with the bromic breath are noted, and the tongue becomes furred. Acne is usually absent. The renal secretion is often largely increased. We have known a patient to pass more than one hundred ounces in the twenty-four hours, and we have noticed that where there is no increased diuresis, the sedative effect of the drug is more prompt and decided. Such cases require a less-prolonged bromide-giving.

With some there is slight transient loss of co-ordination in the fingers, and in very sensitive subjects there may occur mild twitchings of the forearm tendons. These soon subside, and their going may be hastened by local faradic *séances*.

Another bromide symptom, and curious, relates to a peculiar form of aphasia, as shown by using one word for another,—Brown for Jones, cake for comb, etc. This may persist for days. Dr. Clarke refers to several such cases, and says, "They are hints of a distinct organ of language, and suggest the notion that, inasmuch as the drug we are considering paralyzes reflex before it does general sensibility, language may be the expression or correlation of a peculiar reflex power."

Another symptom is an odd effect on the memory, the loss of a word or sentence and entire inability to regain them at the time, so that the train of thought is abruptly ended. This, though often amusing, is sometimes quite annoying to the patient, but has no other importance, and soon subsides.

Before ending this phase of treatment, we must again insist that all cases of opium-taking do not require the bromide alike. This is a point of prime importance, and failure to put it in practice is often the main secret of ill-success or unpleasant results in its use. The patient, as well as his disease, must be treated, and he who uses the bromide as Fothergill asserts Opie mixed his colors—"with brains"—will get the most good. Let it be distinctly understood that some cases are ineligible for the bromide treatment. Those complicated with serious lesion of heart or lung should be excluded, and those with marked general debility should always be given a previous tonic course; and, as before asserted, *in each and every case where it is used, the extent of its giving is to be governed entirely by individual peculiarity, as shown both before and during treatment.*

Having secured the desired sedation, and reached the last day of opiate-using, it is our practice to give, at or before bedtime of that day, a full dose of morphine. This secures a sound, all-night sleep, from which the patient wakens much refreshed and often quite surprised at his good condition, which usually persists during the day. Towards evening—though it may be delayed till night or the next morning—some reflex symptoms may be expected, which are met with 20 grains of quinine, followed by ½-ounce doses of fluid extract of coca every second hour. Some cases require nothing else. If this fails, we give full doses of fluid extract of cannabis indica every two hours, or less often, as may be required. If more decided measures be called for, we use hot baths—105° to 112°—of ten to twenty minutes, and repeat as required. A short shower or douche of cold water often adds

to their value. Nothing equals them for this purpose. Warm baths are worthless. The water must be *hot*, as much so as patient can bear.

And just here as to "full doses" of the hemp. The book dose is useless. As stated, opium-taking begets a peculiar tolerance of other nervines, and they must be more freely given. We give 60 minims of Squibb's fluid extract, repeated as mentioned. Small doses are stimulant and exciting, large ones sedative and quieting. And lest some timid reader should think this reckless dosing, we hope to calm his fears by saying that the toxic power of hemp is feeble, and that these doses are the result of experience with the drug in many cases in which small ones have failed of the desired effect.

For relief of neuralgic pain varied measures suffice. Leading the list are electricity and the local use of ether. As to the value of the galvanic current in migraine and other neuralgiæ, so common in opium *habitués*, and the manner of using it, the reader is referred to papers by the writer, reprints of which can be had, if desired. The same agent is effective in relieving limb and lumbar pains, though here a much stronger current is required than can be used with safety about the head. Sometimes a faradic current acts well, and when one fails, trial should always be made with the other. Local hot baths are often of great service.

Regarding the ether, those who have never used it will, we think, be surprised at its pain-easing power. In either way applied,—spray, drop, or lavement,—it is potent for good.

These three—electricity, ether, hot water—are our own main anodynes, and one special point in their favor is entire freedom from unpleasant gastric or other result.

Other remedies at times relieve. Acetanilide, antipyrin, exalgin, or phenacetin, in 10- or 15-grain doses, are of value. The latter has often a decided hypnotic effect. Croton-chloral, 10 grains, or fluid extract of tonga, may act well. Menthol, two drachms to the ounce of alcohol, by brush or spray, or the menthol cone, sometimes serves. So, too, bisulphide of carbon, and the camphor and chloral combination.

Under this plan of treatment marked disorder of stomach or bowels is rare. Our rule is to give a mercurial or other cathartic at the outset, if there be alvine torpor, and then secure regular action by such laxative as seems best. If restraint be needed, large enemas of hot water may be used. This failing, 30-minim doses of fluid extract of coto, in capsules, or 60 grains of subnitrate of bismuth every four hours. If, however, it persists, the best thing is a full opiate,—tinct. opii, per mouth or rectum, at bedtime preferred. This promptly controls, gives a full night's sleep, and the trouble seldom returns. Fear of a bad effect on convalescence is unfounded.

Diet is not restricted, unless the condition of the stomach or bowels renders it necessary. We have again and again seen patients recover who did not vomit once, or who had only two, three, or four movements daily. The excessive vomiting mentioned by Levinstein and Obersteiner—abrupt disuse—we have never noted. The former thought the collapse—which we have never seen—in several of his cases was due to the vomiting and purging. More likely the largest factor in causing it was the exhausting general mental and physical suffering which his monstrous method entails. If the stomach rebels, entire rest for a time, or milk and lime-water, malted milk, or bovinine, in small amount, may act well. If not, sinapisms, ether, faradism, or bismuth, chloroform, menth. pip., and ice are of value. All failing, a full opiate hypodermic will promptly suffice.

Twenty-four hours after the opiate-quitting, patients are directed to bed, and kept there two to four days, for we are convinced that rest is an aid of great value. This, too, is Erlenmeyer's opinion, who says, "The best remedy is rest in bed. The importance of quiet, rest in bed, and warmth in promoting restoration during the abstinence struggle, cannot be overestimated. I order every patient to bed at the start, and can state with confidence that those who submit to this till I allow a change will get along more easily and satisfactorily during the treatment than others who do not obey, but who insist on moving about or having the run of the premises."

Having thus crossed the opiate Rubicon, treatment relates largely to the debility and insomnia. For the former, of tonic stimulants, coca leads the list. Of Squibb's fluid extract, we give 4-drachm doses three or four times daily, and, as need for it lessens, decrease the dose to 1 or 2 drachms, and this amount, combined with other tonics, may be given for weeks. As a rule, however, its use is quite ended in a fortnight. To remove the mental and physical depression, the minor neuralgiæ, and the desire for stimulants sometimes observed in these cases, nothing equals

it, and full doses of tincture of capsicum often add to its value.

Opinions vary regarding cocaine. Obersteiner lauds it; Erlenmeyer decries it. In some cases it acts well, its use being limited to the rest period of treatment, but is unsafe for self-using, excess being almost certain. It may be given in 1- to 2-grain doses of the muriate, largely diluted, by mouth, every three or four hours, or subcutaneously in half that amount twice as often.

Another agent of much service is general faradization, twenty-minute *séances* daily, the feet on a plate to which the negative-pole is attached, while the other electrode, encased in a large sponge well wet with warm water, is applied to the entire surface, with a current strong enough to be well felt but not painful. This imparts a feeling of exhilarating comfort, and thus applied, or with anode to cervical spine, it may be used daily, taking care not to overdo, for a current too strong or long works mischief, overstimulating and exhausting to the extent, it may be, of several days' discomfort, which nothing but time will remove. Exceptionally, faradism disagrees.

Galvanism is another general tonic of special value. Our method is positive pole to nape of neck and negative to epigastrium for five minutes, then the former behind the angle of each jaw for a minute or two, making entire *séance* seven to nine minutes.

Next to the electric tonic ranks the cold shower-bath. With many it is a great invigorator, and patients who dread it at first soon come to appreciate it most highly. With some it acts as a hypnotic. We recall one case, in particular, of a medical man, who, still insomnic, after sleeping two or three hours, and awaking with no prospect of further sleep, would take a shower, followed by vigorous rubbing, and soon fall into a refreshing slumber, lasting till morning.

Internal tonics, of course, have a place in the roborant *régime*, varied as the case may demand. An excellent one is fluid extract of coca, with syrup or elixir, hypophosphites, iron, strychnine, and quinine, two drachms of each after meals. Another, Fowler's solution or quinine, with tincture of nux vomica, and dilute nitromuriatic or phosphoric acid. If anæmic, ferric tincture or Blancard's pills. Digitalis is useful. In some cases cod-liver oil is of value, with pepsin and quinine, with phosphates or plain, and may be given for months.

Some anorexia is usually present, yet it may not prevent the regular meal, and need never occasion anxiety, for it will likely give place to a vigorous appetite, which may be encouraged to fullest feeding short of digestive disaster. If it be slow in returning, it has seemed a good plan to rouse the alvine system, once or twice a week, with a mild cathartic at bedtime, or a full morning dose of rubinat or hunyadi.

Regarding the insomnia, Levinstein said, "Sleeplessness, which is generally protracted up into the fourth week, is very distressing." Our record differs. Wakefulness is an invariable sequel, but under the plan we pursue it is usually not so marked or prolonged, and in ordinary cases recovery can generally be promised, without the loss of a single entire night's sleep. We have known a patient able to dispense with hypnotics in five, others in eight, and the average, in a series of cases, was eleven nights.

The insomnia is of two kinds. Most patients secure sleep on retiring, but waken early,—two or three o'clock,—and fail to get more. Others remain awake nearly all night before slumber comes, and these usually require soporifics the longer. For relief of this, cannabis indica, or chloral and bromide, in full doses, suffice. The hemp is given in 40- to 60-minim doses, in capsules, or mixed with glycerin or ginger syrup, two hours before bedtime. When it acts kindly, there may be noted, in some, laughing and talking during the first hour, tending to sleep in the second. Many require nothing else. At the end of a week it is lessened, and, usually, ended in ten or twelve days.

Chloral, during the first four or five nights of opium abstinence, fails as a soporific, often causing a peculiar excitement or intoxication,—patients talking, getting out of bed and wandering about room,—followed, it may be, after several hours, by partial sleep. Later, in full doses,—we prefer 40 grains at once, rather than two 20-grain doses,—alone, or with a bromide, it can be relied on.

Other hypnotics—sulphonal, chloralamide, somnal, hypnal, amylene, paraldehyde—in full doses may be used, but will fail unless patient be free from pain. The first is the most valuable, 15 to 30 grains fine powder, dry on tongue, well rinsed, two hours before retiring. The time and style of taking are important. Erlenmeyer, who uses it largely, told us he gave it in a glass of hot milk at tea-time.

If, as rarely happens, the sleepless state is so pronounced or prolonged as to distress patient, we never hesitate to give a full opiate, by mouth, and with good result.

Erlenmeyer says, "In such cases there remains nothing to do but to resort to morphine. I give, then, the alkaloid internally on two consecutive evenings; a certain cumulative affect takes place. The first night after the administration of the morphine by mouth, in the dose of ⅓ grain, there is usually no sleep; but on the second night, after giving the same dose, a sound sleep of six to eight hours' duration will ensue. When this course is followed up once or twice a week, for several weeks, it often brings about a good healthy condition in the patient, and it is no rare experience with me to find the repeated administration of these small doses of morphine for a short time result in such benefit and recuperation that it was soon possible to stop it altogether. I have not observed any special danger from these resumed doses of morphine, although I feared it; but after I was constrained in several bad cases, when every other medicine had failed, to resort to this, I was convinced that my fear was groundless."

In all cases drugs should be dropped as soon as possible, and sleep secured by a walk or other exercise,—an electric *séance*, a Turkish or half-hour's warm bath, a light meal, a glass or two of hot milk, one or more of these before retiring. Patients whose slumbers end early often note a peculiar depression on waking, and if so, a lunch, hot milk, coca, coffee, beef, or bovinine should be at command.

It may be well in passing to refer to certain minor sequelæ and their treatment. Dyspnœa or palpitation may distress. A stimulant—coca with capsicum or Hoffman's anodyne with aromatic spirits of ammonia—will promptly control.

Some patients are at times annoyed by aching pains in the calves. Strong galvanic or faradic currents, hot water, massage, chloroform, or ether will usually relieve. Others mention a peculiar burning in the soles of the feet, for which mustardized foot-baths and large doses of quinine may be used.

Pain in the abdomen may be eased by hot poultices or fomentations, and full doses of camphor with capsicum. The latter, with atropine injections, act happily in ovarian irritation.

Very rarely the unrest and insomnia are so marked that we use hyoscyamine. If so, Merck's amorphous, $\frac{1}{12}$ to $\frac{1}{6}$ grain, or hyoscine hydrobromate, $\frac{1}{100}$ to $\frac{1}{50}$ grain, hypodermically, or double the dose of either, by mouth.

Delirium may occur, but usually is mild and transient. Condensed food, with alcohol, should be freely given. If marked, one or more morphine injections may be added.

Collapse, which we have never seen, as threatened by irregular pulse and breathing, pallid, livid skin, or faintness, demands prompt treatment or the patient will die. An immediate injection of morphine, full dose, must be given, and repeated every ten or fifteen minutes, if required.

It is our custom to continue the evening dose of quinine for several days.

In many cases we give a full opiate forty-eight hours after its habitual taking is ended, and sometimes a second dose seventy-two hours later. This breaks the abstinence tension, affords a grateful respite, recurring symptoms are lessened, and the general effect is, we think, good.

Soon as possible after the rest period in bed, patient should have the outer air and sunshine, at window, in open carriage or car, much walking or other active exercise being avoided for a time, for, if too early taken, they are very apt to be followed by fatigue, unrest, and insomnia.

Along with what has been suggested should be such other general measures as will add to the good secured. Patients must have attractive surroundings, cheerful society, diverting occupation, amusement, music, the play, and freedom from worry of body or mind; in fact, anything, everything that will aid in the effort to secure a return to pristine health. That the management of these cases *subsequent* to the need of active medical care is of great importance, enlarged experience increasingly convinces. Neurotic or other disorders noted prior to addiction, whether genetic or not, must be relieved or removed. So, too, those that may first appear after the opiate-quitting; and when none of these are met, when there is merely a lessened power of brain and brawn, ample time—months or years, if need be, for the greatest danger is within the first year—must be taken in which to get thoroughly well, if the chance of relapse would be brought to a minimum.

It is not to be supposed that a system shattered by opiate excess will regain its normal status in a week or month, or that a premature return to mental or physical labor will not imperil the prospect of permanent cure. The importance of this must be insisted on. To medical men, who compose so largely the better class of *habitués*, it is especially commended. Professional work must not be resumed too soon. The risk of a narcotic reusing is in reverse relation to

the opiate abstention, and as favoring this abstinence, prolonged rest, change of scene, foreign travel, sea-voyages, all have much promise of good.

Some details of treatment other than strictly remedial may be of interest. Our rule, in the opiate decrease, is not to inform the patient as to its progress, nor the actual time when it is ended. Better tell him days after the last dose, and then the assurance that so long a time has gone since his enemy was routed will of itself be an aid in the good work.

As regards the mode of taking, a radical change is made. If hypodermically, the syringe is discarded, and a sufficient amount of morphine or opium given by mouth. In most cases this can be done at once. If not, their use causing nausea, vomiting, or headache, the usual method can be resumed for four or five days, and then, the bromide influence having been secured in part, the syringe may be put aside.

Patients taking 10 grains or more daily subcutaneously will usually get along with the same amount by mouth. Under that, an increase of one-half or double is needed.

Some may demur to the change, but it should be insisted on, for experience has proven many points in its favor. There is, we believe, often a fascination about the syringe, which, once ended, marks an advance towards success. Many patients come to think the injections essential, and to convince them to the contrary, as the change in taking will, gives them a feeling of gladsome relief and larger confidence in a happy result.

Again, the *staying* power, so to speak, of morphine or opium by mouth is much greater. The effect hypodermically is quicker and more decided, but earlier subsides,—a higher acme sooner reached and ended; whereas, by mouth or with opium, the rousing effect is slower, but more even and persistent. Patients injecting four to eight times daily will often do well on two or three doses by mouth.

As a rule, too, the change in taking brings a betterment in the patient's condition, notably increased appetite and improved alvine action.

During the decrease they are permitted, if desired, to continue their frequency of taking. As a rule, however, for reason given, it is not required. The only restriction imposed is that a certain supply shall suffice for twenty-four hours, and this is daily decreased at such rate as will least likely conflict with their comfort. Patients, moreover, are always told that if the amount allowed is not enough, they are to apply for and will be given more. Such being the case, no proper motive exists for secret taking, and if, despite this liberal proviso, it is indulged in, professional relations are suspended.

Clandestine taking, before or after withdrawal, can always be detected. The absence of certain sequelæ of an honest quitting, and the infallible test of a two days' vigil, furnish proof beyond dispute.

The usual duration of treatment in simple cases under our care is four weeks, the rule being to dismiss patient, if other conditions favor, after he has been able to sleep each night, for a week, without hypnotic. Erlenmeyer, whose method is rapid reduction, though without the valued aid of preliminary sedation, says, "Three or four weeks are generally sufficient to remain in the institute; the sojourn may be longer than this, but should not be less." This, of course, refers to the period of active medical care. The need and importance of further hygienic measures we have noted, and they are absolutely essential to insure a lasting cure.

Levinstein advised: "As soon as the patient has consented to give up his personal liberty, and the treatment is about to commence, he is to be shown into the room set apart for him for the period of eight to fourteen days, all opportunities for attempting suicide having been removed from them. Doors and windows must not move on hinges, but on pivots; must have neither handles, nor bolts, nor keys, being so constructed that the patients can neither open nor shut them. Hooks for looking-glasses, for clothes, and curtains must be removed. The bedroom, for the sake of control, is to have only the most necessary furniture,—a bed, devoid of protruding bedposts, a couch, an open wash-stand, a table furnished with alcoholic stimulants, champagne, port wine, brandy, ice in small pieces, and a tea-urn with the necessary implements. In the room which is to serve as a residence for the medical attendant for the first three days, the following drugs are to be kept under lock and key: a solution of morphine of two per cent., chloroform, ether, ammonia, liq. ammon. anis., mustard, an ice-bag, and an electric induction apparatus. A bath-room may adjoin these two apartments. During the first four or five days of the abstinence, the patient must be constantly watched by two female nurses."

Why this rigorous *régime?* Because the lack of efficient medical measures makes essential physical force. Because the method entails such distress of mind and body as to risk a suicidal ending; and a calamity always impends,—collapse, that threatens life, and demands that the doctor be closely at hand to avert the dreaded danger.

In contrast with this, during our opiate withdrawal, patients are permitted and encouraged to go out and about, attend entertainments and engage in social pleasures, and this is continued throughout the treatment, save a transient suspension after the first twenty-four hours of abstinence.

Following the first day of opiate-disusing, during the rest time of treatment, patients are for a while under special attention, and, if needed, an attendant is with them, but the need for such service is usually limited, and, in some cases, not required. Again and again have patients presented who feared the torture imposed by Levinstein, but were happily surprised to find it not demanded, and fully convinced, before treatment ended, it was not essential.

In this day of advanced therapeutics, the writer thinks it wrong, grievously wrong, more, it is *cruel*, to demand that they shall run the gauntlet of such suffering. We care not who advocates it, but speak feelingly, emphatically, and advisedly on this point, for the simple reason that our experience proves, beyond all doubt, that the opium *habitué* can be brought out of his bondage without any such crucial suffering as that method of treatment entails.

Bartholow says, "Having had one experience of this kind, I shall not be again induced to repeat it, if for no other, for strictly humanitarian reasons, since the mental and physical sufferings are truly horrible."

Many so dread the ordeal of abrupt disusing, and, unaware that a more humane method is at command, they refuse to accept it, and, continuing their narcotic, bind all the more closely "the web that holds them fast as fate." Six years ago a medical gentleman, nine years addicted to morphine, 11 grains a day hypodermically, came under our care. Twelve years ago he first consulted us. During the interim he read Levinstein's book, and the dread of such suffering as that author's patients underwent was, he avowed, the reason for his delay in making an effort to quit the morphia. Finally, summoning sufficient courage, the trial was made, and with the most gratifying success, for, greatly to his surprise and pleasure, he made a notably good recovery, with so little nervous disturbance that not a single bath was called for nor an anodyne once demanded, and was dismissed on the twenty-sixth day of treatment. Commenting on his case, he declared the manner of his recovery seemed "almost miraculous," and asserted that had he ever thought so much could be accomplished at so little cost of time and discomfort, his effort years earlier would have been made. Later he wrote: "My own swift and easy passage of that 'one more river to cross' is an ever-recurring source of wonder and astonishment to me, and not a day passes, not a morning comes, without a keen sense of exultation at my escape from the old slavery, a blessed freedom from the old self-accusing conscience, and a return of the old instinctive habit of looking every man straight in the eyes. I think I shall never entirely get rid of a certain shadow of the past. Nearly nine years of mental distress, which I thought well-nigh hopeless, must leave a deep and ugly scar at my time of life, but thank God that I have only the scar to trouble my memory, and not the festering, corroding, ever-present ulcer which made me unspeakably wretched, and kept me in continual fear of discovery. With an unexpected restoration of complete physical and mental vigor, the ugly past experience seems like a horrid nightmare, in which, just as I was toppling over the brink of the precipice, a friendly hand grabbed me in time to save from destruction. The shock and mental strain were too great not to leave an indelible impression upon the mind, but the wound has healed kindly, and only a scar remains to mar the fair proportions of restored self-respect and to modify somewhat the exultation over the recovered '*mens sana in corpore sano.*'" This gentleman is now, and has been for six years, in perfect health.

CACTUS GRANDIFLORUS IN HEART-DISEASE.

By J. E. Engstad, M.D., Grand Forks, N. D.

I HAVE prescribed cactus grandiflorus in heart-troubles to a considerable extent for the last four years, and I now depend on it in preference to digitalis in functional disorders.

As far as I am aware, the regular medical profession has to a certain extent discarded the use of this excellent remedy. There are

a number of roads to Rome, and there may be a number of remedies that answer to a certain degree the same purpose that cactus does; but in some functional diseases it is superior to the other heart stimulants. The homœopathists and eclectics use it before digitalis and strophanthus, and have done so for years. The homœopathic literature is very rich in "provings" and experience.

It is difficult to obtain a good specimen, as most of the fluid extracts on the market are worthless and inert. Merck and Parke, Davis & Co. make excellent preparations.

I have in mind a case of a young law student, who complained of palpitation of the heart while walking or exercising in the gymnasium.

His pulse would intermit every third beat while standing. If sitting, the heart would lose every fourth beat. If recumbent in bed he would not be troubled by any sense of suffocation as he was while standing, and the heart would be very regular.

I gave him fluid extract of cactus, 15-drop doses, three times a day. The functional disturbance was soon relieved. After discontinuing the use of the medicine for some time he suffered a relapse, which was again speedily relieved by the use of the cactus. No organic lesion was present.

I now recall a case of effusion in the pericardial sac. All known remedies had been tried except cactus. After using it for some time he recovered completely, as he thought. But a "conquering hero," in the form of a travelling doctor, informed him that he never had any heart-disease, and that heavy work was what he needed. He had been advised to the contrary by myself and other physicians. He worked one week, and then I was called. Enormous dilatation, respiration labored, expression pale and anxious; pulse weak, 32 per minute, but quite regular. I gave cactus for the heart, together with other treatment. Compensation has now taken place, and he expresses himself as feeling as strong as before the organic defect was first noted.

Recently I had a lingering case of typhoid pneumonia in a lady of 35. Her heart became feeble after the second week. Digitalis and strychnine were tried without any benefit. Cactus stimulated it immediately. She made a good recovery.

In convalescence from typhoid fever it is excellent in cases where the heart shows symptoms of failing. Some time ago I had a case where the patient was so weak and his heart so overtasked that a feeling of syncope appeared if the head was raised from the pillow. Cactus was given with benefit.

Its special field is in functional disorders, as in angina pectoris, where it is almost a specific. I have never been disappointed in its results. I may probably in the future meet with cases that will not be amenable by treatment, but thus far angina pectoris has been easy to relieve by the use of the remedy.

The dose I have found to answer the best purpose, and where the best results have been obtained, is about 8 or 10 drops of the fluid extract, or 15 drops of Merck's tincture, three to four times a day.

BROMOFORM IN WHOOPING-COUGH.

Dr. Hugo Löwenthal, of Professor Senator's clinic in Berlin, has tried bromoform in the treatment of whooping-cough, it having been recommended by Dr. Stepp, of Nürnberg, and he is disposed to agree with him in considering it a very valuable remedy. Dr. Löwenthal says that it exerts an almost specific action upon whooping-cough, at all events, if it is used at the commencement. A hundred children were treated with it, varying in age from 8 weeks to 7 years. The doses given were from 2 to 5 drops three or four times a day. The liquid was simply dropped into a tablespoonful of water, and formed a bead floating in the water. The quantity dispensed at once was about a drachm. The parents were cautioned to keep the bromoform from the light, as otherwise it is liable to be decomposed. As a rule, the good effects of the medicine began to show themselves on the second or third day, the vomiting being arrested within a week after the commencement of the bromoform. In cases where complications, such as pneumonia, occurred, they ran a favorable course, and where there were relapses, a return to the bromoform soon arrested the symptoms. In a very few cases the drug appeared to produce sleepiness and lassitude, and in one case, that of a weakly child a little over a year old, where a drachm had been given in the course of three days, a semi-comatose condition was induced. Subcutaneous injections of ether revived the child, who was found to have pneumonia. This, however, ran a rapid and favorable course, and afterwards the whooping-cough was successfully treated by renewed doses of bromoform.—*Lancet*, July 19, 1890.

The Therapeutic Gazette

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Leading Articles.

DEATH OF DR. WILLIAM BRODIE.

DR. WILLIAM BRODIE, formerly editor of the THERAPEUTIC GAZETTE, died at his home in Detroit, Mich., on July 30 last.

Dr. Brodie was born at Fawley Court, Buckinghamshire, England, July 28, 1823, and at the time of his decease had just entered upon his sixty-eighth year.

In 1833 he emigrated to America, settling on a farm near Rochester, N. Y. Later on he entered and through his own efforts maintained himself at Brockport College. Here he remained three years, graduating with honors. In 1847 he removed to Michigan, where, in the office of Dr. Wilson, of Pontiac, he began the study of medicine. He then returned to the East and entered Berkshire Medical College; later he entered the College of Physicians and Surgeons, New York, from which he graduated in 1850. Returning to Michigan, he settled at Detroit, and at once obtained the position of house surgeon at St. Mary's Hospital. Dr. Brodie was also examining physician for St. Andrew's and St. George's Societies. In 1855 and 1856 he was secretary of the American Medical Association. At this period Dr. Brodie edited the *Peninsular Journal of Medicine.*

At the outbreak of the late Civil War he was appointed surgeon to the First Regiment Michigan Volunteer Infantry; subsequently he was appointed brigade surgeon, and soon after returned to Detroit.

In November, 1851, Dr. Brodie married at Pontiac Miss Jane Whitfield, a native of Hampshire, England. They have two sons and one daughter. Dr. Brodie has been a life-long member of the Episcopal Church.

From 1866 to 1871, and from 1887 until incapacitated by his last illness, Dr. Brodie was a most efficient member of the Board of Health. Since 1873 he has acted as surgeon to the Fire Department, a position he held at the time of his death. In 1885 he was chosen a trustee of the Detroit Medical College, also filling the chair of *emeritus* professor of the principles and practice of medicine and clinical medicine.

Dr. Brodie was at different periods the presiding officer of the Michigan State Medical and Wayne County Medical Societies; in 1887 he was president of the American Medical Association, and the same year first vice-president of the Ninth International Medical Congress.

Twelve years ago Dr. Brodie assumed editorial charge of the predecessor of the GAZETTE, which was then known as *New Preparations*, a weekly journal devoted to the consideration of the drugs of more recent introduction into the materia medica. Dr. Brodie at once enlarged the scope of its usefulness, and while still devoting especial attention to the newer remedies, made it also a journal of general therapeutics. After one year's existence the name of the journal was changed to the THERAPEUTIC GAZETTE, as indicative of the wider field it covered and the abandonment of its original *raison d'être.* That Dr. Brodie succeeded in establishing the position of the GAZETTE as an independent journal, one appreciated and needed by the profession, is shown by the subscription-list, which during his editorial management increased from less than one thousand to eleven thousand five hundred *bona fide* subscribers. We cannot but feel that the continued prosperity of the GAZETTE under the management of Dr. Wood, and now under the present editor, is mainly due to a close following of the policy mapped out by Dr. Brodie.

The death of Dr. Brodie will come with the shock of a personal bereavement to a much wider circle than his immediate family. Few had a greater list of acquaintances, no one more loving friends. Although he relinquished with his editorial work the onerous duties also of the practising physician, he still kept a warm interest in the doings of the medical world, while his unfailing good nature, rare attainments, and warm heart endeared him to all who came in contact with him.

DIURETIC PROPERTIES OF THE ELDER (SAMBUCUS NIGRA).

THE elder is a remedy which possessed great repute among the ancients; the Greeks and Romans employed it in a number of affections, especially when they desired to produce diuresis or catharsis, and both Theophrastus and Hippocrates speak of its efficacy in the treatment of dropsies. Pliny, the elder, also recognized its diuretic properties, as was the case with Dioscorides, Galen, and Avicenna. Even up to the end of the eighteenth century elder was employed as a diuretic, and Sydenham insisted upon its value as a specific in ascites and œdema.

The properties of the elder, however, gradually passed into oblivion, until its action was reinvestigated by Martin Solon (1832). He confirmed Sydenham's experiments, but again his results attracted no attention, and the elder as a drug has now become almost obsolete, being employed only as a household remedy, where it still possesses a certain amount of reputation as a remedy for dropsy and constipation. There are several varieties of elder, of which the *Sambucus Nigra* and *Sambucus Canadensis* are best known, the latter being indigenous to America from the range of the Carolinas as far as Texas, while the *Sambucus Nigra* is the common elder of Europe.

The flowers, the berries, and the inner and outer barks all possess active properties, and as testimony seems to be almost unanimous as to the existence of diuretic properties, it is surprising that the remedy has been neglected.

In November, 1889, Dr. Combemale reported before the Société de Biologie a series of experiments which he had undertaken with the elder, and which clearly demonstrated the existence of marked diuretic properties, and his experiments afforded the only truly scientific research as to its clinical uses with which we are acquainted, until Dr. Georges Lémoine published a long essay, as to its properties and uses, in the *Gazette Médicale de Paris*, No. 24, 1890. He shows that the effects of the inner and outer barks are different, the former being the more active, although its properties differ accordingly as to whether it has been treated with warm or cold water. The fresh bark only, he finds, should be employed, and in Combemale's experiment he used a watery extract, administered by the stomach. Combemale likewise administered a decoction of both barks to guinea-pigs, and found that a marked diuretic action was produced, lasting for about four hours; while a dog, to whom the same decoction was administered, not only showed marked increase in the amount of urine passed, but there was also noted a diminution in the temperature and the frequency of the pulse and respiration. The inner bark contains a volatile principle, and likewise, when administered in the form of a decoction, produces diuresis in doses of a drachm for every two pounds of body-weight, while the temperature at first is increased and then gradually descends below normal, the pulse likewise being retarded. If the volatile principle of the elder be not displaced, as in the production of a decoction, and a maceration of the elder bark be employed, it would seem that the volatile principle interferes to a certain extent with the production of diuresis, and then nausea and vomiting frequently follow its ingestion, with abundant diarrhœa, the temperature being reduced and the pulse likewise retarded.

Dr. Lémoine applied these physiological results so obtained by Combemale to a series of clinical observations, and was able to confirm the experience of the older observers as to the production of diuresis by its employment in ascites and anasarca. Dr. Lémoine always employed the fresh inner bark, a large handful being placed in a quart and a half of water, which was then boiled down to about a quart. This decoction was then sweetened with sugar and aromatized with mint, and was administered to the patient in about twenty-four hours, a new decoction being made each day. Dr. Lémoine states that he has never observed any vomiting following the employment of elder-bark, nor has he ever seen it produce sweating, one of the properties which was attributed by the ancients to elder, while with but few exceptions there was in all cases marked diuresis, followed within two or three days by liquid stools.

He concludes that the elder so employed as a diuretic is of the utmost value, and may yield the most valuable services in the treatment of ascites and anasarca, consecutive to diseases of the heart and kidneys. Under its use he has seen the quantity of urine increased nearly eightfold, and this large amount maintained almost as long as the remedy was being administered. So also when its effects commence to decline, the diarrhœa also, which assists in the reduction of ascites, likewise diminishes. Dr. Lémoine principally employed the elder in nephritis, especially in the acute congestive form; its action then being more rapidly produced than in chronic Bright's disease. The first case in which he employed it was that of a woman, 32 years of age, who, as a consequence of improper use of a catheter, acquired cystitis and ascending infectious nephritis. There was considerable anasarca, the peritoneum and pleura contained liquid, and the patient was in danger of dying from œdema of the lungs. After only the first day's use of a decoction of elder-bark the urine nearly doubled, while on the fourth day nearly ten times as much urine was passed as at first. The anasarca rapidly diminished, and it was not until the cellular tissues were entirely free from effusion that the quantity of urine and the number of diarrhœic stools were reduced.

Two other cases also of acute nephritis are alluded to in which the results were equally satisfactory, but in six cases where nephritis was of long standing the effects were less apparent, although even there diuresis was increased and œdema somewhat reduced. This amelioration was, however, only transient, and the effusion rapidly accumulated as soon as the use of the elder bark was suspended. Dr. Lémoine states that in the œdema, in consequence of heart-disease, the elder will likewise in the majority of cases produce improvement through its action on the kidneys and the intestine. Especially in cases where there is fatty heart, and where digitalis cannot be supported, elder-bark will render great service as a diuretic.

Finally, it is said to be entirely innocuous, and is, therefore, preferable to cardiac remedies. It would seem to act solely on the kidneys, for Dr. Lémoine states that it in no way modifies the activity of the heart or the circulation, and would thus seem to be a simple diuretic, producing filtration of the urine by an irritation of the renal epithelium. Nevertheless, he states that this action is accompanied by no unfavorable changes in the character of the renal cells, for after having given it for more than a week to a guinea-pig, microscopic examination of the kidneys showed no organic change. So also in the case of an ovarian cyst, the abdominal ascites was reduced under its employment, to return after its administration was stopped.

The elder is thus a remedy which seems unworthy of the neglect into which it has fallen. It would be interesting to have a confirmation of Dr. Lémoine's results, while experiments are highly desirable as to the exact mode of action of this remedy, and as to which of the different principles found in it its properties are attributable.

SOME NEW REMEDIES FOR WHOOPING-COUGH.

GENSER was one of the first to apply antipyrin to the treatment of whooping-cough. He gives the results of one hundred and twenty cases; the average duration was twenty-four days, instead of from sixty to ninety, the ordinary term. As many decigrammes (1½ grains) were administered daily as the child was years old (*Wiener Medizinische Presse*, 1888).

Dubousquet-Laborderie obtained similar results in fifteen cases; there was marked diminution in the frequency and severity of the paroxysms, and the period of decline announced itself much sooner than ordinarily (*Bulletin Général de Thérapeutique*, t. cxiv. p. 385).

Sonnenberger tried antipyrin in seventy cases of whooping-cough; to young infants he gave it in doses of ½ to 1½ grains three times a day; to older children, from 3 to 15 grains. He also records marked alleviation of the attacks and shortening of the duration of the disease (*Lancet*, March 3, 1888, p. 437).

Antipyrin is, however, by no means always innocuous when administered to children, and some cases of poisoning have been reported. Rothe, having met with some unfortunate results from antipyrin, made trial of a combination of iodine with carbolic acid, and claims great success from this combination in the treatment of whooping-cough. He says that he has treated hundreds of cases, and cannot remember one in which the affection lasted longer than four weeks. The mixture he employs is as follows: Acid. carbolic., gr. xv; sp. vin. rect., gr. xv; tinct. iod., gtt. x; tinct. bellad., gtt. xxx; aquæ menth.

pip., ℥ii ; syrup. opiat., gr. cl. A teaspoonful of this is given to children over two years of age every two hours (*Lancet*, April 6, 1889, p. 701).

Acetanilide (antifebrin) has been used with advantage as a nerve sedative and antispasmodic in whooping-cough. At the meeting of the American Medical Association, held in Newport, R. I. (*Medical Record*, July 6, 1889, p. 21), Dr. Love, of St. Louis, spoke of the treatment of fifty cases of whooping-cough by acetanilide, and regarded it as a valuable remedy; and in a report of cases observed at the New England Hospital during the years 1888 and 1889, Dr. Kate C. Hurd alluded to "the remarkable benefits of acetanilide in pertussis." It "both mitigates the paroxysms and shortens the duration of the disease." The dose is from ½ to 5 grains three times a day, according to the age of the child.

A writer in the *Lancet* asks the question whether phenacetin is a remedy in whooping-cough, and Dr. R. Heimann answers the question affirmatively, having used the drug experimentally in a case in which antipyrin entirely failed. The success was so surprising that he administered phenacetin in two other cases. It reduced the number of paroxysms, which had been from ten to fifteen per diem, to three, and on some days they entirely ceased, only reappearing at night, when no phenacetin was given. The dose for a child 3 years of age would be 1½ grains every three hours (*Lancet*, October 19, 1889, p. 811).

Sulphurous acid fumigations have been recently tried in whooping-cough at the Charity Hospital, at the New England and other hospitals. Manby relates, in the *Practitioner* for August, 1888, his experience with sulphurous acid, which has given him great satisfaction. The method is as follows: "The children are in the morning put into clean clothes and removed elsewhere. All their clothes and toys, etc., are brought into their bedroom, and sulphur is burnt upon a few live coals in the middle of the room. The fire is allowed to remain in the room for five hours, and then the windows and doors are thrown open. The child sleeps in the room the same evening. About twenty-five grammes of sulphur to every cubic metre may be burned; this is equivalent to rather more than ten grains per cubic foot. The room is fumigated in like manner during the night, the children practically living in an atmosphere of diluted sulphurous acid gas for some days, while in some cases the process is repeated at the end of a week" (*Medical Record*, August 25, 1888, p. 215).

Weisberger, in the *Bulletin Général de Thérapeutique*, April 15, 1890, speaks enthusiastically of this remedy. He causes to be burned, morning and evening, in the room of the child ten grammes of sulphur, and subjects the child for an hour to the fumes. The gas produced by the combustion of this quantity of sulphur is not sufficiently concentrated to cause more than a slight irritation in the nose and throat.

Recently a new remedy — *ouabaïne* — has come into vogue. In the THERAPEUTIC GAZETTE for June (p. 411) will be found a full summary of all that is known of this new remedy and its uses in whooping-cough. Ouabaïne is, however, a dangerous remedy to give, and as the dose is necessarily very small, great care is needed in its management. Terpine, according to Talamon (*La Médecine Moderne*, July 24, 1890) is a much safer medicament. In children under a year old, according to Manassé, it may be prescribed in the dose of 5 grains three or four times a day. It diminishes the violence and duration of the paroxysms, and hastens the cure of the concomitant bronchitis. Talamon would counsel somewhat smaller doses (10 to 15 grains a day for an adult), though he thinks that larger doses may be safely given. He regards the employment of terpine in whooping-cough as "rational." It acts "as a calmer of the nervous system; it modifies at the same time the bronchial secretions, which it dries up; it has also antiseptic properties, which enable it to act not only on the symptoms, but on the course of the whooping-cough."

Of all the newer remedies, Talamon would give the preference to terpine, especially if the pertussis is accompanied by an abundant catarrhal secretion. The following formula, in which terpine is associated with antipyrin, is recommended:

> Terpine, 1 to 1.50 grammes;
> Antipyrin, 1 gramme;
> Syrup of orange-peel, 50 grammes;
> Linden-water (or mucilage), 60 grammes.
>
> Dose —From 1 to 2 teaspoonfuls several times a day to a child of from 1 to 4 years of age.

OREXIN AGAIN.

CONTINUED study of orexin only serves to confirm the opinion which we expressed in regard to this substance in several late numbers of the GAZETTE as to its almost

absolute inertness. The last contribution to the subject is by Dr. Edward Reichmann. He writes that soon after the publication of Penzoldt's results he commenced to experiment with this substance in the clinic of Dr. Riegel, in Giessen, and he publishes his results in the *Deutsche Medicinische Wochenschrift* for July 31, 1890.

Dr. Reichmann administered the remedy to thirty six different patients, in doses varying from 4 grains, given once or twice daily, up to 7½ grains, given in one dose in gelatin capsules, its administration being followed, as recommended by Penzoldt, by a large amount of water. The greatest care was taken to avoid any psychical influence being produced which might obscure the true action of the drug, and his results, although by no means as favorable as those of Penzoldt's, are yet not quite so unfavorable as those of Imrèdi's, Martin's, and Mühler's, already published in the GAZETTE. He states that a distinct increase of the appetite was produced in five cases, while a less marked influence was produced in eleven patients, observable after the first few doses had been administered. In twenty other cases no effect whatever was observable, in some nausea and vomiting being produced, though in no case of a severe character. Investigation of the contents of the stomach, after the administration of orexin, was made in six different cases, and the results in this respect seemed to confirm Penzoldt's statement, in that there was an increase in the amount of hydrochloric acid present. Of course, it is very difficult to decide as to what the actual position of any new remedy is, and we must admit that one or two positive statements by unbiased observers as to the effect of a remedy are worth many negative results. In the case of orexin, however, the mass of testimony certainly is against the claim advanced by Penzoldt as to its great power as a stomachic, though it, like so many other substances, might, in a few cases, produce relief.

Dr. Podgorski, in experiments made in the Krakau Hospital (*Deutsche Medizinal-Zeitung*, July 31, 1890), has likewise been able to confirm the claim of Penzoldt that the administration of this remedy in a fasting condition produces an increase in the amount of acid in the gastric juice, and he likewise claims that in certain instances it produced transient improvement in the appetite, in a few cases produced vomiting, while in by far the majority of cases it was entirely without any action. Further, Dr. Imrèdi, in the *Munch. Medic. Wochenschrift*, No. 17, 1890, likewise failed to produce any favorable effects in its employment, although its administration was in many cases followed by nausea and vomiting. Finally, Belalmrèdi (*Les Nouveaux Remèdes*, July 24, 1890) claims that, out of twelve cases, in seven there was some improvement in the appetite, while in five no benefit was produced.

It certainly looks now as if Penzoldt's effects, who is the only enthusiastic advocate of the properties of orexin, were attributable to the extract of gentian with which he combined it.

THE TREATMENT OF CHRONIC BRIGHT'S DISEASE.

WHATEVER theory may be held as to the unicity or duality of Bright's disease in general, and whatever may be known respecting the etiology of the particular case which the physician has before him, the treatment must be mainly symptomatic. This is apparent from the permanency of the lesions of which the symptoms are an expression. A treatment based on etiological considerations might, indeed, by suppressing the cause, prevent any further extension of the mischief; thus, if there should be a history of lead-poisoning in the patient and saturnine nephritis, one might, by preventing any further absorption of lead, be able to spare such portions of the kidneys as had hitherto escaped the destructive influence, but this is all that could be expected of etiological therapeutics. The older writers, regarding the indication as plain to attack the element of inflammation, advised the moderate and judicious use of antiphlogistics, such as leeches, cups, and even mercury (Dr. Geo. B. Wood). It is needless to say that mercury is now never given, at least for any direct effect on the disease-processes, and that cups over the lumbar region are seldom employed, even in the acute exacerbations.

To combat the albuminuria, recent authorities counsel the exclusion of albuminoids from the ingesta. By permitting an animalized diet, they say, we produce an augmentation of the albuminuria, and injure the epithelia of the canaliculi abnormally traversed by the albumen and globulin of the blood. The loss of albumen by the renal secretion is, however, as Senator has shown, a matter of trifling importance as compared with the damage likely to be done to the still permea-

ble portions of the renal filter by overworking them ; and there is good evidence that an excess of azotized ingesta irritates the kidney and raises arterial tension, in both these ways rendering the condition of the patient worse.*

There is general agreement that milk constitutes the ideal food in albuminuria. It is easily digestible ; if fresh and pure, it contains no waste materials of disassimilation, no poisonous ptomaïnes to irritate and overtax the epithelium of the canaliculi ; all the nitrogen which it contains is utilizable ; it is rich in fat, and it is diuretic, by the latter fact favoring depuration through the damaged tubuli. Under a milk diet, coincidently with diminution of albumen, there is increase in the excretion of urea and other natural products of the renal secretion, and this is of the utmost importance in a disease in which renal insufficiency is the principal danger.

The milk diet may be absolute, mitigated, or mixed (to use terms current with foreign writers). Absolute milk diet consists in the daily administration of three or four quarts of milk, to the exclusion of all other food. The milk may be taken sometimes raw, sometimes boiled, cold or warm, sweetened or not, according to the liking of the patient, and flavored, to suit the taste, with cognac, cherry laurel, anisette, or other aromatic substances. A half-pint every two hours during the day and night is as much as most patients will tolerate ; this, if continued three or four days, is generally attended with marked polyuria and mitigation of the dropsical, uræmic, and other bad symptoms.

In the "mitigated" milk diet, the quantity of milk is reduced to one or two quarts, and gruel, porridge, rice, tapioca, custards, etc., are given in addition.

The mixed diet consists in the addition of a variable quantity of milk to the ordinary diet. The patient may drink freely of milk, with the meals and between meals ; in some cases he may make only one meal of solid food a day (in the morning), taking nothing but milk during the rest of the day.

Most authorities oppose the use of eggs, whether raw or cooked, in the dietary of Bright's disease. Eggs, doubtless, often augment the albuminuria. However, we find Oertel, Schreiber, and Klemperer insisting on their general innocuousness. Klemperer declares that he has never seen the albumen of the ingesta produce an augmentation of the albuminuria.†

The fact is, as Lecorché and Talamon have pointed out,‡ that "the general rules of dietetics, on which almost everybody is agreed, cannot be carried out in an absolute and uniform manner in all periods of the disease, and, in their application, we must take account not only of the state of the kidney, but also and especially of the state of the digestive functions and of the general nutrition. We know that a highly azotized diet augments, while a milk diet diminishes, the proportion of albumen in the urine. But we will now and then have a patient whose stomach does not digest milk, and his albuminuria will be aggravated under a too-severely imposed milk regimen, while another with good digestion will peptonize and digest the albumen of eggs without detriment to the renal filter. Another patient whose forces are exhausted by debilitating habits of living will have his heart fortified and his nutritive powers raised by a judicious dietary, of which animal food and eggs shall constitute a principal part." This seems to be a commonsense view of the case.

Those who have read the articles by Dujardin-Beaumetz "On Vegetarianism from a Therapeutic Point of View," in the March number, and "On the Treatment of Renal Insufficiency," in the July number of the THERAPEUTIC GAZETTE, cannot fail to have been impressed by the arguments which are advanced in favor of a vegetable diet in

* "It is certain that these albuminoid substances, even when normally peptonized, absorbed, and transformed, convey into the circulation an abnormal quantity of urea, of uric acid, and of extractive matters, whose incessant elimination by the kidneys is sure in the long run to alter the renal filter. Atrophic gouty nephritis has no other cause than this continued excretion of an abnormal quantity of uric acid. But every kind of exclusive diet ends in fatiguing the stomach and vitiating its function. What, then, becomes of the peptonization of this excess of azotized matters? It remains incomplete. Now, the researches of Voit, of Eichorst, etc., show that peptonization is not indispensable to the intestinal absorption of certain albuminoid substances. Therefore, being absorbed unchanged, or after an insufficient digestion, in the state of hemialbuminose or of imperfect peptones, those substances are indisputably a cause of irritation to the kidney; and we have shown that a great many cases of Bright's disease, to which it is impossible to attach a clearly evident etiology, have probably no other cause than the prolonged and incessant elimination of the products of a vitiated digestion."—Lecorché and Talamon, "Traité de l'Albuminurie," etc., p. 631.

† "Discussion at the Ninth Congress of Internal Medicine, held in Vienna, April 15–18, 1890."

‡ "Traité de l'Albuminurie et du Mal de Bright's," p. 630. Paris, 1889.

Bright's disease. The same views are advocated by Senator and Von Ziemssen (and other speakers) in their addresses delivered at the late Vienna Congress, and by Lépine at the Berlin Congress, all of whom insist that cereals, vegetables, and fruits, joined to fats and milk, should suffice for the diet of the albuminuric. Senator urges the avoidance of hearty meals. As for drinks, there is general agreement that alcoholic stimulants are to be interdicted, as they tend to congest the kidney; at the most, a little red wine, especially of those kinds that contain considerable tannin, may be permitted.

There is often an indication for the promotion of diaphoresis, both to favor elimination by the skin, and thus relieve the kidneys of a part of their burden, and to improve the circulatory energies. The safest and mildest mode of sudation is, doubtless, the hot-air or vapor bath. Ziemssen counsels the use of these baths at home, limiting them to twenty or twenty-five minutes' duration, followed by dry wrappings or the wet pack. In cases of actual uræmic poisoning these vapor baths or the full warm bath should be resorted to at once in conjunction with free catharsis.

As for muscular exercise, this should be very moderate, for reasons that are sufficiently plain; all exercise should, in fact, stop short of fatigue. Passive exercise, in the form of massage, may be practised within due bounds. It is almost needless to say that mild laxatives may be needed to insure regular action of the bowels, that warm clothing, to protect from changes of the weather, is necessary, and that much rest in bed should be enjoined.

Uræmic symptoms may at any time appear. This is especially likely to be the case when much of the secreting substance is damaged or destroyed, and when from overwork or overeating the metabolism of albuminoids is exaggerated beyond the ability of the kidney to remove the effete products and toxines. Here prompt, thorough derivation by the bowels may be demanded; a compound jalap powder or an elaterium purge may spare the engorged kidneys and cause a flux by the intestines that will tide the patient over the present danger.

As for diuretics, there seems to be less tendency than formerly to resort to them as routine means of treatment. Certainly those diuretics that irritate the canalicular epithelium, such as the resins and balsams, cantharides, strophanthus, and squills, are not to be thought of. The cardiac diuretics are only to be prescribed when there are symptoms of failing heart, while the alkaline mineral waters, broom-top, and corn-silk may be used with safety. Lépine speaks highly of the crystallized digitalin in the dose of 1 milligramme. This dose, however, he would only give every other day. Caffeine, in the dose of 5 grains three times a day (preferably by hypodermic injection), and the salicylate of theobromine, 15 grains three times a day, are recommended as safe diuretics. These diuretics are especially indicated when the patient is "water-logged" in the advanced stages of parenchymatous nephritis, when also the hydragogue cathartics may be needed. Senator has found calomel of no efficacy in the œdema of Bright's disease.

In interstitial nephritis, remedies that lower arterial tension, like nitroglycerin, nitrite of soda, and iodide of potassium have been found beneficial.

As for the medicinal treatment generally in chronic forms of the disease, there was general agreement among the speakers at both Congresses that not too much is to be expected. "Astringents, experimented with in cases of nephritis of parasitic origin, have failed; fuchsine has given continual disappointment; arsenic and boric acid, ferruginous preparations, have given no results to all those who have taken pains not to allow themselves to be deceived by observation of the variations which the march of the disease habitually presents."

Reports on Therapeutic Progress.

THE EXCRETION OF BALSAMS IN THE URINE.

The use which is now being made of balsam of Peru in the treatment of tubercular disease has aroused considerable interest in the question as to whether it is apt to produce nephritis during its excretion by the kidneys. Dr. Ralph Stockman, research scholar of the British Medical Association, has made a number of observations on it and other balsams with the view of determining this, and the results of these are published in the *British Medical Journal* for June 14, 1890.

Strictly speaking, the term "balsam" should be confined to resins and oleo-resins which contain cinnamic or benzoic acid or both, and hence, although commonly used, it is not properly applicable to simple oleo-resins,

such as Canada balsam or balsam of copaiba. The observations were carried out on Dr. S. W. Carruthers, on the author, and on rabbits, and were limited to the four balsams in the British Pharmacopœia,—namely, balsam of Peru, balsam of tolu, prepared styrax, and benzoin.

Balsam of Peru.—Balsam of Peru contains about thirty per cent. of resin, sixty per cent. of volatile oil, six per cent. of cinnamic and some benzoic acid. It has hitherto been chiefly used in scabies as an inunction, either in its natural form or diluted with alcohol, but lately Landerer has praised it highly as an external and internal remedy in tubercular affections. He used it as an intravenous injection (emulsion of 1 in 400), and externally in ethereal solution, or as a plaster, or pure. Opitz has also reported very favorably of it in phthisis pulmonum, his method of employing it being in the form of subcutaneous injection, —balsam of Peru, two grammes; water and gum acacia, of each one gramme; three-fourths per cent. salt solution to ten cubic centimetres; neutralize with sodium bicarbonate and sterilize by heating; dose, a syringeful twice weekly. It caused some pain and swelling locally.

Regarding nephritis after balsam of Peru, cases have been reported by Litten and by Vamossy. In Litten's case the patient was treated with inunctions of balsam of Peru for scabies, and after some days developed dropsy and albuminuria, with blood in the urine and tube-casts. After recovery, 20 grammes were rubbed into his skin on several occasions, and each time caused an attack of acute nephritis. Other patients and rabbits treated with the same balsam of Peru did not suffer in any way. Litten ascribes the result to an idiosyncrasy, but the most probable explanation is to be found in the fact that the man had suffered for some time from lead-poisoning, that changes were probably beginning in his kidneys, and that this rendered them peculiarly sensitive to any irritant.

Vamossy has used balsam of Peru, in the form of gauze, plaster, and emulsion, for the treatment of local tuberculosis. It was tried in twenty-eight cases, mostly severe, with good results. In four of these cases Vamossy states that albuminuria occurred, but he gives no account of how he tested for the albumen, which, as we shall see later on, is a very important point.

Brautigam and Nowack have recently administered balsam of Peru in large doses to men (up to 11 grammes per day by the stomach and 125 grammes in two days by inunction) without in any case producing albuminuria or tube-casts.

The experiments which the author made on himself bear out their observations. After taking smaller doses without any result, he swallowed 180 minims (14 grammes) between 11 A.M. and 5 P.M.

The urine on being tested with cold nitric acid, or on heating after acidifying, gave no precipitate. At three and five o'clock it contained a large quantity of hippuric acid, but no albumen. The only effects noted were loss of appetite, and once or twice slight colic.

With rabbits, although there is no albuminuria, the results were not so negative. 2 drachms (9 grammes) were given by the stomach to a large rabbit. The urine of next day was clear, straw-colored, and had no special odor. On applying the nitric-acid tests for albumen in the usual way, it gave precipitates exactly resembling those of albumen. The precipitate was, however, soluble in alcohol and in excess of acid, thus proving that it could not be albumen.

The reactions were as follows:

Urine + nitric acid = dense white precip., sol. excess acid, sol. alcohol.

Urine + sulphuric acid = dense white precip., sol. excess acid, sol. alcohol. It soon assumed a purplish-red color, gradually deepening to black.

Urine + hydrochloric acid = dense white precip., sol. excess, sol. alcohol.

Urine + acetic acid = very faint precip., sol. alcohol.

Urine + boiling with drop nitric acid = dense white precip., sol. excess acid, sol. alcohol.

Dr. Stockman was unable to obtain a sufficient quantity of the substance to examine it minutely, but there is no doubt that the resin of the Peru balsam is excreted by the kidneys, dissolved in the urine (probably in combination with glycuronic acid), and that it is precipitated by the addition of an acid. A similar condition has long been known in man, in the case of copaiba and cubebs. Its non-occurrence in man after balsam of Peru is probably explained by too small doses having been given. The urine may be left for many days exposed to the air without undergoing decomposition.

4 drachms (18 grammes) given to a rabbit by the stomach gave similar results, and no albuminuria.

Prepared Styrax.—Styrax is also a mixture of resin, volatile oil, and cinnamic acid, and is used in scabies and other parasitic skin-diseases. The only account of nephritis after its use is given by Unna. He was in the habit of treating his scabies patients with the following mixture: Styrax, oil of rape, of each 10 parts; spirit, 1 part. It was rubbed in thrice all over the body, a bath was then taken, and the cure was complete. In examining the urine, he boiled it with nitric acid, and no further control tests were used. Out of one hundred and twenty-four cases, the urine of nine gave an abundant precipitate. In all these the urine was clear; there was no blood-corpuscles and no tube-casts. He remarks that it is peculiar that a comparatively large amount of albumen should rapidly appear in the urine, and then as rapidly disappear without causing further symptoms. He had no suspicion that it could be anything but albumen. The results of Dr. Stockman's experiments on rabbits show, however, that it was a resinous body, which had become absorbed through the skin and excreted in the urine.

After taking a mixture of styrax, alcohol, and glycerin in different doses without any result, he swallowed one hundred and eighty grains (about twelve grammes) in four doses between eleven and two o'clock. The urine remained quite clear, and gave no precipitate with nitric acid; at five, seven, and eleven o'clock it contained large quantities of hippuric acid, but no albumen.

A rabbit received 1 drachm in olive oil, and a few drops in alcohol, by the stomach. Next day the urine was quite clear, and gave the following reactions:

Urine + nitric acid = dense white precip., sol. excess acid, sol. alcohol and ether.

Urine + sulphuric acid = dense white precip., sol. excess, sol. alcohol. Became deep red and then black.

Urine + hydrochloric acid = dense white precip., sol. excess acid, sol. alcohol.

Urine + acetic acid = very faint precip., sol. excess acid, sol. alcohol.

Urine + boiling with drop nitric acid = dense white precip., sol. excess, sol. alcohol.

5 drachms (about 20 grammes) gave the same result, and no albuminuria.

It is evident from the solubility in alcohol that here also we have to deal with a resin excreted in the urine and not with albumen.

Benzoin.—Benzoin contains eighty per cent. of resin and a small amount of volatile oil, with cinnamic and benzoic acids. Dr. Carruthers took in capsules from forty to one hundred and forty grains in twenty-four hours, without causing any very distinct changes in the urine. On two occasions there was faint opalescence with acids, which cleared up on the addition of alcohol, but it was very difficult to decide whether it was caused by a resinous body or not.

Rabbits received up to two drachms, in glycerin and alcohol, but here also the results were negative. Owing to the difficulty of dissolving it in suitable menstrua, it was found impossible to give larger doses.

Balsam of Tolu.—The tincture (1 in 8) is given internally as an expectorant. The syrup, which contains only 1 part in 29, is too weak to be of much value except as a flavoring agent. Dr. Carruthers took up to one hundred and twenty-four grains in twenty-four hours. There was always a good deal of hippuric acid in the urine, but no resin could be detected. Owing to the difficulty of getting a suitable solution, it could not be administered to rabbits in a sufficiently large dose for the purpose of the research.

As a result of these observations, it seems to be proved that all those balsams can be given in as large a dose as is ever desired in practice, without any risk of producing albuminuria or nephritis. The amount of irritation which they cause is never sufficient to injure the healthy kidney, although it may irritate seriously one which is already diseased. In some (at least) of the recorded cases of albuminuria, after the administration of balsams, a resinous body in the urine has been mistaken for albumen.

SUSCEPTIBILITY TO THE EXTERNAL EMPLOYMENT OF TANNIC ACID.

In a recent issue of the GAZETTE we alluded to a case reported by Dr. Lange, in which the application of a solution of tannic acid to the pharynx produced serious œdema of the larynx, and the production of marked general urticaria and great prostration. In the *Deutsche Medicinische Wochenschrift*, No. 12, 1890, DR. SCHRAMM reports an analogous case. It was that of a man, 53 years of age, affected with chronic nasal catarrh, who was extremely hypochondriacal and timid. Dr. Schramm prescribed nasal douches, which the patient administered to himself at first with a weak soda solution and then with one which contained one part of tannic acid with three hundred of water. After the first

employment of the tannic acid solution, the patient complained of violent pain in the head and complete obstruction of the nose. Although there was great depression there was no trace of any exanthema. As the alkaline douches which were then substituted for the tannic acid produced no improvement in the local condition, Dr. Schramm then again employed a tannic acid solution, 1 to 300, and again its use was followed by the same accidents, although at this time there was a general eruption of urticaria produced. The employment of tannic acid had then to be abandoned, and cauterization by nitrate of silver was employed, and was well supported by the patient.

PILOCARPINE AS AN ANTAGONIST TO BELLADONNA.

In the *Lancet* for July 26, 1890, Dr. William McGowan writes that a little before noon on December 25, 1889, he was called to visit a married woman, aged about 37, who was said to be dying from having taken a quantity of a liniment by mistake for a dose of a mixture she had been ordered.

On examining the bottle, it was found that she had taken a large tablespoonful of belladonna liniment, and her condition was at that time very serious. She was totally unconscious and breathing stertorously; there were frequently recurring convulsions; the pupils were widely dilated, so that there was only a ring of iris, and they were not influenced by light; the extremities were cold, the heart greatly excited and weak, and the pulse scarcely perceptible at the wrist. She presented all the appearances of approaching death. Some attempt had been made before the writer's arrival to procure vomiting, but without success. As she could not swallow, Dr. McGowan injected $\frac{1}{16}$ of a grain of apomorphine. This failed to produce vomiting, and, fearing the depressing effect sometimes produced by the drug, he did not repeat it, but at once introduced the tube of the stomach-pump, and thoroughly washed out the stomach. The stomach was almost empty, and no odor of belladonna could be detected in the water returning from it. He then injected hypodermically $\frac{1}{3}$ of a grain of pilocarpine, passed the catheter, and withdrew nearly a pint of urine, injected a pint of strong hot coffee into the rectum, and used flagellation with a wet towel over the chest and cheeks, and mustard was applied to the calves of the legs. In about half an hour improvement was observed; her countenance became more natural. A little later she looked about her, and was soon able to swallow small quantities of sal volatile and coffee. About five hours later, Dr. McGowan, on returning, found the patient sitting up in bed, in a rather excited condition, and talking deliriously. The author injected another third of a grain of pilocarpine. It did not at any time produce perspiration, but only a little softness of the skin. From this time recovery was uninterrupted. She complained of thirst and dryness of the throat, and remained very weak, being unable to get up for nearly a week.

This case is worthy of record, on account of the apparently antagonistic influence of the pilocarpine to the belladonna. As over four hours had elapsed from the time the poison was taken until Dr. McGowan saw her, the belladonna must have been entirely absorbed, as, indeed, was clear from the absence of odor of belladonna in the washings of the stomach, and from the very marked and characteristic effects. Although he used the stomach-pump, he does not attach much importance to this part of the means adopted.

THE TREATMENT OF SYPHILIS BY SUBCUTANEOUS INJECTION OF MERCURIAL PREPARATIONS.

Dr. Leloir and Dr. Tavernier, of Paris, having practised this method of treating syphilis in all sorts of syphilitic cases during two years, now (*Giorn. Ital. d. Mal. Ven. e. del Pelle*, 1889, xxiv. 247) give a statistical report of their experience and a summary of their conclusions (*New York Medical Journal*, August 9, 1890). In all they made fifteen hundred and seventy-three injections. Of these, eight hundred and seventy-five were of 1 part calomel to 12 parts liquid vaseline, a half Pravaz syringeful being thrown into the sacro-lumbar muscles, and repeated once a week; six hundred and forty-two were of the yellow oxide of mercury, prepared and used in the same manner as the calomel; and fifty-six were of "gray oil," consisting of 20 parts of pure mercury, 40 parts of liquid vaseline, and 5 parts of the ethereal tincture of benzoin, of which a third of a syringeful was injected every ninth day. They found, 1, that these injections acted specially upon the erythematous syphilide and upon the secondary cutaneous eruptions; 2, that the injections of calomel and of the yellow oxide, especially the first, often caused

these eruptions to disappear with a surprising rapidity, or, as they named it, a "true brutality;" 3, that the calomel acts most intensely, and the gray oil least; 4, that all three are much more energetic in their effects than any internal method of medication, though much rougher; 5, that their action on syphilides of the mucous membrane, especially mucous patches, is very slight, and, even while the injections are being practised, numerous mucous patches will appear; 6, that their action upon tertiary syphilides is very uncertain, as they very often resist the injections and have to be treated by inunctions and the local application of mercury. The principal *inconveniences* from this method of medication are the following: 1. The local or radiating pain caused by them, sometimes most violent, and capable at times of preventing walking. This may last from one to nine or more days. 2. Paralysis of the lower extremities. 3. Vertigo and headache. 4. Eruption of mucous patches in the mouth on the fourth or fifth day after the injection. 5. A mercurial dermatitis about the point of the injection. 6. Mercurial stomatitis, often slight, sometimes severe and long-continued. 7. A simple or bloody diarrhœa some time during the interval between the injections. 8. Non-suppurating cutaneous tumors, sometimes filled with a reddish serum. The treatment met with much opposition in hospital practice, many patients preferring to leave the hospital rather than submit to it. Relapses seemed to be more frequent and precocious in cases treated by this method than in those treated by mercurial inunctions. The calomel injections produced the greatest number of disorders. The gray oil is the most inoffensive, but also the least active. The practical deductions from their experience are: 1. The use of subcutaneous injections of mercury should be limited to the early eruptions on the skin. 2. They may be resorted to when it is necessary to produce a very rapid effect on these eruptions. 3. They are specially, if not exclusively, applicable to hospital patients, or to those who can remain in bed for a few days. 4. It is a good means for treating prostitutes. 5. Its action upon mucous patches is very bad. 6. It does not prevent relapses. 7. In many cases it fails to cure, and recourse must be had to inunctions. 8. It should not be used against the late syphilides except in those exceptional cases in which it is necessary to use mercury internally at the same time with its local use and the administration of the iodide of potassium. 9. It is contraindicated in cerebral and spinal syphilis, in visceral syphilis, in pregnant women, and in infants. The only advantage of the method is the rapidity of its action. But this advantage is more than balanced by its inconveniences.

SUGAR IN THE BLOOD.

The condition known as melitæmia, or the presence of sugar in the blood, has long been recognized. Pavy, Ewald, Seegen, and Otto have demonstrated beyond doubt that sugar is a normal constituent of the blood, although it is present only in very small proportions; the quantity is not altered when the blood is analyzed after death. The proportion of sugar in the blood is considerably raised in cases of diabetes. In 1885, Freund examined the blood of seventy patients suffering from carcinoma, and found it to contain a large quantity of sugar, but he was unable to detect it in cases of sarcoma. Freund's experiments have not been fully verified by other observers. In the *Centralblatt für die Medicinischen Wissenschaften*, 1890, No. 25, TRINKLER gives an interesting account of a series of observations he has made as regards the amount of sugar contained in the blood in various diseases. He examined the blood of one hundred and nine patients, and the investigation fell into two classes: 1. Quantitative estimation of sugar and reducing substances in the blood during life, the quantity of blood required being obtained during the performance of operations. 2. In which the greater number of analyses took place after death. The diseases from which the patients were suffering were carcinoma, typhoid fever, pneumonia, morbus cordis, dysentery, peritonitis, nephritis, uræmia, etc. Sugar was found to be present in all the cases. In carcinoma the amount was very large, next came typhoid fever and pneumonia, while nephritis and uræmia exhibited the least. In the case of carcinoma, the following conclusions could be drawn: 1. The blood of patients suffering from carcinoma always contained a considerable percentage of reducing substances, of which the chief was grape-sugar. 2. The maximum percentage of sugar in the blood of living patients was less than the maximum obtained after death. 3. Carcinoma affecting the internal organs produced a greater quantity of sugar than when attacking superficial structures (skin, mucous membranes). 4. The degree of cachexia stood in no direct proportion to the percentage of sugar in the

blood. The quantity of sugar in acute pneumonia, typhoid fever, and dysentery was about the same, and very little above the normal; while in nephritis, and especially in uræmic conditions, the quantity was below the normal.—*Lancet*, July 26, 1890.

ICHTHYOL IN DISEASES OF WOMEN.

According to the Berlin correspondent of the *Medical Press and Circular* for July 23, 1890, Dr. H. W. Freund, of Strasburg, recommends ichthyol as useful, both externally and internally, in a number of the sexual diseases of women, especially those of inflammatory origin. In his hands it has proved more efficacious and more rapid in its action than any other remedy. It has also the useful effect of quickly relieving the pain that accompanies pelvic inflammations. In chronic parametritis, chronic and subacute perimetritis, in inflammation of the tubes and ovaries, in erosions of the os, and in pruritus of the external genitals, it is capable of bringing about a quite surprisingly rapid and complete cure. Internally, he gives the ichthyol in doses of .1 gramme, or a grain and a half in pill three times a day to commence with, and later in doubled doses. Externally, he employs a mixture of ichthyol 5 parts and glycerin 100 parts, on tampons of cotton introduced into the vagina. When energetic resorption is demanded, he employs the ichthyol with equal parts of lanolin or with green soap, 8 parts of ichthyol and 80 of soft soap, rubbed over the abdominal walls. He also uses it in the form of suppository, .5 to .2 gramme. In the case of erosions, he has painted the pure sulpho-ichthyolate of ammonia on the os and cervix, and has observed very rapid healing. In pruritus he uses it in the form of the ointment (ichthyol 10 parts, lanolin 90 parts, is a very good form, corr.), or a ten per cent. aqueous solution. The digestion improves under its use. The results of its intravaginal application are, according to Dr. Freund, positively astounding. Thick cicatrices in the laquear disappeared in the course of a few days, parametric cicatrices thinned down and became less rigid, tubal pains diminished, etc. The pain-relieving quality of the ichthyol was quite as remarkable as its very unusual one of promoting absorption. No ill effects were ever observed. The author acknowledges, however, that there are cases where ichthyol alone does not suffice to bring about the desired result, but other methods of treatment must be put into use in its support. Thus, when the pain is very great and the case permits, he uses tampons, which contain from two to five per cent. of chloral hydrate in the glycerin employed, and goes on to the ichthyol after the pain has subsided. And again, after resorption has taken place, he leaves off the ichthyol and passes on to massage or electricity. Very obstinate and even desperate cases should not be submitted to operation until a trial has been given to ichthyol.

THALLIN IN TYPHOID FEVER.

Dr. F. Schmidt, in his graduation thesis at Berne in 1889, reports the results which he obtained in the employment of thallin in twenty-two cases of typhoid fever, the remedy being given in doses varying from ¾ to 3 grains in a day, with nothing given at night. The following are his conclusions (*Les Nouveaux Remèdes*, July 24, 1890):

1. The mortality of typhoid fever treated by thallin is less than that obtainable by any other mode of treatment.

2. Thallin, in the doses above mentioned, distinctly reduces the temperature in cases of moderate intensity, but in typhoid fever of extreme gravity this dose is insufficient. It also would seem that the patients support thallin better than cold baths.

3. In general the duration of the disease is not diminished, although this effect would appear to occur in a few isolated cases.

4. No unfavorable secondary action was noted either on the heart or lungs. There was no collapse or irritation of the kidneys. Nevertheless, basing his conclusions on the results obtained by other authors, Schmidt advises the withholding of thallin in all cases where renal lesions have been detected.

5. Thallin maintains a favorable influence on the sensorium in all cases of typhoid fever except those of extreme gravity.

6. Complications and relapses are not prevented by the use of thallin any more than by any other form of treatment.

7. If it is impossible to discover any specific action of thallin on typhoid fever, at least it would appear that certain effects exist which render this action probable.

Finally, the author considers the treatment by thallin in the majority of cases as in no respect inferior to that of cold baths, and in cases where there is a rapid progress of the

disease would even seem superior. After having analyzed the thesis of Schmidt, Rutimeyer adds that he has never observed collapse even after doses considered excessive, even more than 7½ grains being given. In this amount thallin appears to clear the brain in severe as well as in the milder forms of typhoid fever.

OBSERVATIONS ON THE PROPORTIONS OF THE CHIEF PROTEIDS OCCURRING IN THE URINE IN VARIOUS FORMS OF ALBUMINURIA.

In the *British Medical Journal* for July 26, 1890, Dr. Noel Paton and Messrs. John Douglas and Ronald Mackenzie publish an elaborate analysis of the different proportions of the more important proteids occurring in the urine in various forms of albuminuria. They conclude with the following summary of their results:

1. Senator was right in the conclusion that, in all cases of albuminuria, both of the chief proteids of the blood plasma are present.

2. The proportions of serum albumen and serum-globulin may vary within wide limits, the quotient of the amount of serum-albumen divided by the amount of serum globulin being sometimes as low as .6, sometimes as high even as 39.

3. In acute nephritis, when blood is absent, the quotient is high. When hæmoglobin is present, the globulin is, of course, in excess.

4. As the disease becomes more chronic the quotient sinks, and in the terminal stages of the disease may sink as low as .6. This alteration depends upon the condition of the patient rather than upon the state of the kidney, and is probably related to a similar change in the blood plasma.

5. Amyloid disease cannot be distinguished from the ordinary forms of chronic nephritis by the high proportion of serum-globulin, as was formerly maintained by Senator.

6. Maguire's suggestion that functional albuminuria is characterized by the high proportion of serum-globulin is not correct.

7. In every case the proportion of the proteids to one another varies much in the course of the day, and in comparing the proportion of these proteids in different cases it is necessary to examine specimens of the mixed urine of the twenty-four hours, and to take into account the nature of the diet.

8. The proportion of serum-globulin is always highest during the night. It falls greatly after breakfast, when it reaches its lowest point in the twenty-four hours. In most cases it again rises in the evening. The precise connection of the alteration in this proportion with the taking of food cannot be considered as definitely settled.

9. Milk diet, as observed by Lecorché and Telamon, has a peculiar effect in increasing the proportion of serum-albumen.

10. The amount of proteids passed appears to bear a tolerably direct proportion to the amount of proteids taken, and, excluding milk diet, the increase of the proteids in the urine on a diet rich in these substances appears to be chiefly due to an increase in the serum-albumen.

11. The variations in the proportion of the albumen to the globulin in the urine is frequently so great that we can hardly believe that it is connected with a similar change in the plasma. The few experiments we have performed would suggest that a high pressure favors the transudation of serum-albumen, while a low pressure increases the proportion of globulin transuded.

COTO BARK AND COTOINE IN THE TREATMENT OF DIARRHŒA.

Coto bark possesses in Bolivia considerable reputation as a remedy in the treatment of acute rheumatism and diarrhœa. It occurs in the form of long reddish rolls, whose odor and appearance closely resemble those of cinnamon. Administered internally in excessive quantities it produces gastric pain and vomiting, attributable to the acrid resins and essential oils which it contains. The alkaloid cotoine is also found in the coto bark, as well as leucotine and hydrocotoine; the former crystallizes in yellowish needles, resembling gallic acid, fusible at 130°, soluble in alcohol, chloroform, ether, and the bisulphide of carbon, though but little soluble in petroleum or benzine; it dissolves in alkalies with the formation of yellowish color, in sulphuric acid with a yellowish-brown color, in nitric acid with a blood-red color. It is antiseptic and arrests putrefaction; it is said to stimulate the appetite in doses of from 2 3 grains. Its principal therapeutic value is, however, almost universally admitted to be the power which it possesses of arresting diarrhœa, being especially efficacious in the diarrhœas of phthisis, gouty diarrhœa, and in the diarrhœa of children.

A number of preparations have been employed, of which the tincture, the wine, the powder, and the extract may be mentioned,

though it is preferable to administer the alkaloid cotoine in doses of from 3 to 9 grains each day. Hypodermic injections of cotoine dissolved in acetic ether (1 part in 4) have been proposed, but these injections cannot be recommended on account of the severe pain which their employment produces.—*Journal de Médecine de Paris*, July 27, 1890.

TOPICAL ACTION OF DRUGS ON SECRETION.

According to the Berlin correspondent of the *Medical Press and Circular* for July 30, 1890, Dr. Emil Schütz, of Prague, who has been studying the action of certain drugs in arresting or diminishing, or increasing the secretory activity of glands, finds that a large number of substances—among the metallic salts, acetate of lead, nitrate of silver, sulphate of copper; among the acids, hydrochloric and sulphuric, and tannin, applied to the skin or mucous membranes of frogs—have the effect of diminishing the secretion, this action lasting for hours or even days. The chlorides of potassium and barium act in a similar manner; almost all these substances possess the property of precipitating globulin, even in extreme dilution. The alkalies, alkaline earths, the alkaline and neutral salts of the alkalies, and numerous other substances, such as glycerin, carbonic acid, mustard-seed oil, phenol, if applied at a proper degree of concentration, act in an opposite manner, and increase the secretion. In both cases the effect is independent of the nervous and vascular system, and depends on the secreting elements only.

SALICYLATE OF THEOBROMINE.

As the result of the labors of different investigators, already referred to in the Therapeutic Gazette, as to the diuretic action of theobromine, a discussion has been evoked as to whether theobromine may be combined with salicylic acid or not.

Dr. Sée affirms that this is not possible, and that the substance in the market under the name of "diuretin" is a body soluble in water, and is a mixture only of theobromine and the salicylate of sodium (*Les Nouveaux Remèdes*, July, 1890). It is further stated that theobromine is absolutely insoluble in cold solutions of salicylate of sodium, and the same likewise applies to the mixture of theobromine and salicylic acid. Even when a solution is obtained by heat, precipitation comes on cooling. Sée has, however, been able to obtain a solution without heat by treating theobromine with dilute caustic soda, and by then adding salicylate of sodium or salicylic acid. This, however, gives a product which is by no means fitted for internal use, on account of the high degree of alkalinity of the solution.

EXCISION OF THE OPTIC NERVE AND AVOIDANCE OF ENUCLEATION.

A proposal has recently been made by M. Abadie to prevent sympathetic ophthalmitis by sterilizing the injured eye, by injecting into it a few drops of a solution of corrosive sublimate. The theory on which this proposal rests is, of course, that sympathetic inflammation is a septic process, due to the passage of microbes along the lymph spaces of the optic nerves and chiasma. While accepting the theory, we demurred to the practice, on the ground that it is not possible effectively to sterilize the contents of an eyeball without using an agent which would destroy the vitality of the tissues, and that it was, therefore, better either to remove the globe altogether, or to remove the contents of the sclerotic, and sterilize its cavity.

A lengthy paper in the *Klinische Monatsblätter* for June (*British Medical Journal*, July 19, 1890), by Dr. Otto Scheffels, urges the claims of another substitute for nucleation,—namely, resection of the optic nerve. This is in no sense an outcome of the septic theory of causation, as it is merely a further development of simple neurotomy, which was originally instituted when it was believed that the ciliary nerves formed the communicating medium for the transmission of sympathetic affections. It is now maintained that this practice is in perfect harmony with the septic theory; indeed, the author, to whom we have just referred, considers that the success of this operation in preventing sympathetic inflammation, should it be confirmed by a larger number of cases, is itself to be considered as a proof of the correctness of the theory. The reservation is an important one, as it is impossible to form any notion as to what number of cases would be necessary to prove that it affords absolute immunity. But even were this proved, we fail to see what support would be given to the septic theory, for the ciliary nerves are necessarily divided at the same time, and, as it is at least as likely that

lymph channels should be restored as nerves, the success of the operation would be quite as much in favor of the ciliary nerve theory as of the bacterial.

The author considers that if seven and a half millimetres of the optic nerve with its sheaths are excised, it is impossible that the lymph channels should be restored, and that the gap will form a gulf which the microbes cannot pass. Both these assumptions are, it seems to us, gratuitous. We are not aware of any experiments or observations bearing on the restoration of divided lymph channels, and, as Dr. Scheffels quotes none, we presume he is in the same condition; but, as no profound change takes place, as far as can be seen, in the nutrition of the eye, it is not unreasonable to suppose that the lymphatic circulation is carried on somehow. Because we know little about the habit of these microbes, every one thinks himself at liberty to attribute to them the virtues and impotences that best accord with his own views, but we are not acquainted with any evidence, apart from that afforded by the few recorded cases of neurectomy, and this is of the weakest description, that microbes cannot extend through seven and a half millimetres of cellular tissue, even though the main lymph-channels have been excised.

If the bacterial theory can be proved by other means, and for our part we consider that the evidences in support of it are exceeding strong, then a large number of neurectomies would go far to prove that exsection of a portion of the optic nerve does form a barrier to the progress of microbes, but considering the risks run, such a wholesale clinical experiment would in our opinion be wholly unjustifiable, at any rate until the probability of success has been demonstrated by experiments on animals.

The operation, however, has a definite field of usefulness. When an eye is blind and painful, and is causing sympathetic irritation of the other eye, while from the nature of the case there is no fear of sympathetic ophthalmitis, neurectomy may be useful as a substitute for enucleation, and, as far as is known, it is always successful.

The operation itself presents no insuperable difficulties, although we think that the author makes too light of the trouble arising at the time of the operation from hemorrhage into Tenon's capsule. On two occasions we have seen this entirely prevent reduction of the globe, so that enucleation had to be performed. The internal rectus is sutured and divided, the nerve felt for and divided as far back as possible; the distal end is then seized, and its sclerotic attachment brought into the wound, where it is cut off as close to the globe as possible. Finally, the divided muscle is united by means of sutures left in it for the purpose.

Simple neurotomy, although it has been quite successful in many such cases, has in some proved to be of only temporary benefit, owing to the reunion of the divided nerves. It is, however, a comparatively simple operation, and might in many cases be tried first, neurectomy being reserved for recurrent symptoms.

So, also, according to the Paris correspondent of the *Lancet* (July 19, 1890), in a note by Dr. Galezowski, the well-known ophthalmologist, the author expressed it as his opinion that it was possible to avoid the enucleation of the globe of a lost eye and to leave it in the orbit, at the same time avoiding the dangers of sympathetic ophthalmia. He realizes this by suppressing all the anatomical relations of the diseased eye. The operation is performed in the following manner: He incises the conjunctiva and the capsule, draws forward the globe of the eye, partially divides the optic nerve, and excises all the nerves and the vessels which surround the eyeball, leaving all the muscles intact, and the operation is terminated by reuniting the conjunctiva. In a case thus treated the result is said to have been excellent.

THE CHEMISTRY OF THE GASTRIC JUICE AS AN ELEMENT IN DIAGNOSIS AND THERAPEUTIC INDICATION.

At the meeting of the Société Médicale des Hôpitaux, held July 17, 1890, Dr. Hayem read a paper relating his work as to the value of chemical examination of the contents of the stomach as an element in diagnosis and as a means of forming proper methods in therapeutics (*Le Progrès Médical*, July 26, 1890; *La France Médicale*, July 25, 1890). Basing his results on the quantity of the different chemical elements in the gastric juice already established in a healthy individual, he divides cases of dyspepsia into three groups.

In the first he ranges those which have a functional irritation of the stomach, characterized by an increase in the quantity of chloride present, hydrochloric acid, and total acids in which there is an exaggeration of

the work of the stomach, and which he terms a condition of hypopepsia.

In the second class are found the dyspeptics in whom there is a reduction in all the constituents which should be normally found, and which may go on almost to the condition which he terms apepsia, and this class usually combines the majority of stomach dyspeptics.

The third class is formed by the smaller number of dyspeptics, in whom the chemical composition of the gastric juice is but slightly modified, and in whom the disturbance depends upon mechanical or nervous trouble. He further divides the first class into four different types.

1. The gravest, in which there is interference with digestion due to an excess of the total acidity, and this causes severe pain and rapid loss of flesh, and often, even although the patient may have a large appetite and be abundantly fed. In them there is apt to be also dilatation of the stomach.

In the second type there is usually gastrorrhœa.

In the third type hyperpepsia is a prominent feature, and there is increase in the total amount of acid and of the chloride.

The fourth type is characterized by the presence of fermentative acids, and the patients are generally of a highly nervous character. The second class comprises at the same time feeble digestion, with dilatation of the stomach and neurasthenia, with either excess or deficiency of hydrogen.

The second type of hypopepsia is dependent upon a reduction of the total acidity, and here digestion is null, even though there be an abundance of the gastric juice, the peptones being feeble.

In the third type of dyspepsia, apepsia, there is apparent suppression of all the functions.

Dr. Hayem promises to communicate in a short time the application of these deductions to therapeutics, when we will lay his conclusions before the readers of the GAZETTE.

THE EXCRETION OF MERCURY IN RELATION TO THE VARIOUS METHODS OF ITS EMPLOYMENT.

In the *Medical Press and Circular* for July 30, 1890, the Berlin correspondent states that DR. RUDOLPH WINTERNITZ, who has been studying this subject in Professor Neisser's clinic at Breslau, has lately given us some of the results of his investigations in an article in the *Arch. f. Dermat. und Syph.* In order to get an insight into the subject, it was, first of all, desirable to determine accurately the quantity of mercury in the tissues at varying periods after the administration of fixed quantities. This could only be done on the bodies of animals, and, in fact, it presented such difficulties, that he contented himself, as regards the present undertaking, with testing the quantity of mercury contained in the urine of patients taking it in any way, and in this way drawing his conclusions as to the rate of absorption. His investigation showed that, as regards the excretion by the urine, the method of interstitial injection was far beyond all others. After the injection of insoluble salts of mercury as much as four to eight milligrammes per day were found in some cases. He could not determine whether the symptoms of intoxication went parallel with a diminution in the excretion of the drug. Increased excretion of mercury was not effected by iodide of potassium in doses of even 2 to 3 grammes. No difference as regards excretion by the urine was observed between the insoluble salts, calomel, salicylate of mercury, and the soluble preparations. A parallelism between the quantity introduced and the curative effect was shown by the quantity excreted, whether the mode of administration was by the mouth, subcutaneous injection or local epidermic inunction, or plaster.

THE VALUE OF THE DIFFERENT HYPNOTICS.

The therapeutic committee, of which DR. T. LAUDER BRUNTON is chairman, appointed by the British Medical Association to determine the relative utility of the different hypnotics, especially with relation to the certainty of their action and the question of the tolerance of the drug, publish their report in the *British Medical Journal* for July 26, 1890. Although the report contains but little that is to be regarded as entirely novel, every additional fact bearing on the value of the different substances discussed is, without doubt, worthy of notice, and we, therefore, reprint an abstract of the results obtained.

SULPHONAL.

1. Two cases of simple insomnia, aged 36 and 32. In the first case, insomnia had lasted eleven days; 20-grain dose of sulphonal every night for three days produced two hours' sleep five hours after taking the drug. Sleep was not very peaceful, and was fol-

lowed by a slight feeling of intoxication. In the second case, insomnia had lasted a month, and ammonium bromide, although useful at first, failed afterwards in doses of 40 grains. Sulphonal (20 grains) every morning for a month produced eight hours' natural sleep three hours after taking the drug. No bad after-effects (F. W. Burton).

In a case of neurasthenia and insomnia, which had lasted one or two years, in a medical man, bromides of potassium and ammonium produced a refreshing sleep, but caused great depression after a few days. Sulphonal (20 to 30 grains) two or three nights a week for three months produced, after three or four hours, six to nine hours' sound sleep. There was never any excitement, giddiness, headache, or inco-ordination of gait, but drowsiness followed sleep if 20 to 30 grains were taken as late as 9 or 10 P.M., but not if 10 to 20 grains were taken at 5 or 6 P.M. After using sulphonal as above described till the end of August, 1889, the patient went for a six weeks' holiday to Devonshire, and gave up hypnotics. During all the time the sleeplessness was very bad (not more than two to four hours' sleep a night). Then he returned to work for the winter, avoiding night work; and he began to take 10 grains of sulphonal regularly every evening. He thus secured five to six hours a night of fairly continuous sleep (his usual average in health is seven to eight hours); less than this always left him unrefreshed. In April, 1890, he again went for a holiday, this time travelling about the Highlands of Scotland. He still took 10 grains nightly; and from leaving home had very good nights, sleeping seven to nine or more hours soundly. On returning home after a month and resuming work, the average number of hours per night with 10 grains nightly again fell to five or six. The dose was increased to 20 grains per night, with the effect of raising the average to seven or eight hours. Now the dose has again been reduced to 10 grains, while sleep continues long and sound. No evil effects have been noted, no albuminuria or nervous symptoms, and the patient is certain that 10 to 20 grains nightly have a slight regulating effect on the bowels, acting like a small dose of sulphur. For six months now (June 9, 1890) sulphonal has been taken quite regularly, every night 10 grains, and occasionally 15 to 20 (J. Priestley, M.R.S.S.).

In a case of simple insomnia, which had lasted three months, in a woman seven and a half months' pregnant, 20 grains of bromide of potassium was at first useful, then failed. On two nights 20 grains of sulphonal were given; on the first night the patient slept for two hours, the effect coming on in thirty minutes; on the second night, in five minutes. The patient fell asleep, and remained so for eight hours. There were no bad after-effects following the first dose. On the day following the second dose the patient had repeatedly long sleeps, and suffered from giddiness and inco-ordination of gait, so marked as to alarm the patient's friends.

2. *Acute Fevers.*—In a case of enteric fever in a nurse, aged 24, in which insomnia had lasted two nights, sulphonal (25 grains) on three successive nights produced in two hours quiet sleep, lasting three hours and a half on the first occasion, eight hours on the second, and six on the third, with no bad after-effects. In two cases of typhus in young adults sulphonal was given. In the one in which sleeplessness had lasted one night, 25 grains each night for three nights produced, after two hours, six hours' sleep. There was no excitement or bad after-effects, but the patient talked during the sleep. In the other case, with two nights' sleeplessness, 25 grains in one dose were given for three nights. The first night patient was restless and delirious. He slept the second night, talking during the sleep; he slept on the third night without sulphonal; on the fourth night he had no sleep (no sulphonal), but on the fifth night slept three hours and a half after sulphonal. There were no bad after-effects. In a case of rheumatism with delirium, sulphonal, in 25, 30, and 40 grains, had no hypnotic effect, morphine being successful (Dr. Duffey).

In a case of pneumonia, insomnia had lasted during the whole of the attack. Bromide of potassium (20 grains), with nepenthe (20 minims) did not produce sleep. On the fifth night, sulphonal (15 grains) was given, producing no sleep; on the sixth and seventh nights, 25 grains, the first dose producing, after two hours, interrupted sleep during six hours and a half, the second dose of 25 grains having no effect whatever. The next night, a dose of 30 grains was given, causing two and a half hours' sound sleep, then irregular sleep for four hours. The following night a dose of 30 grains produced a short period of dozing after three hours. There were no bad after-effects. The crisis came after the first dose of 30 grains, and this was the only night the patient got any real sleep. The insomnia continued during convalescence, un-

influenced by bromide and nepenthe, or by bromide (30 grains) and chloral (20 grains) (E. Jackson).

3. *Plumbism.*—In a case of plumbism (insomnia eight days), sulphonal (30 grains) produced, after three hours, good sleep for four hours and a half. Slight inco-ordination of gait was noticed next day, with inclination to sleep, but no other after-effects (J. S. Short, M.D.).

In a second case of plumbism, with granular kidney and extremely high tension of the pulse, insomnia had lasted many weeks, and a drachm of sulphonal produced, in three-quarters of an hour, two hours' sleep. The patient woke up in dyspnœa, which lasted half an hour, but he then slept for two hours and a half. There were drowsiness, giddiness, and headache next day, but no vomiting or inco-ordination of gait (E. S. Reynolds).

4. *Gastric Catarrh.*—In one case with dilated stomach (a few days' insomnia) 40 grains of sulphonal produced, within half an hour, half an hours' sleep, and an irregular sleep for three hours and a half during the rest of the night. There was drowsiness the next day, and the patient was sleeping soundly at mid-day; the pupils were contracted, and she was very thirsty and suffered from headache (E. S. Reynolds).

In a second case, the patient had had, three years previously, an attack of insomnia, lasting eight months; the present attack was of three weeks' duration. Bromide of potassium (20 to 30 grains) had no effect, nor had 10 grains of pulv. ipecac. co.; nepenthe, 25 minims, gave two hours' sleep; sulphonal (20 grains) produced, after nine hours, a quiet and natural sleep, lasting four hours, with no bad after-effects. On another occasion, 30 grains, in five hours, produced five hours' dreamy sleep. There was slight drowsiness following, and very decided inco-ordination of gait until late in the afternoon. Insomnia disappeared when the patient went to the sea-side (E. Jackson).

5. *Heart Disease.*—In a case of mitral stenosis (insomnia four months), in which bromide had been tried, sulphonal (20 grains) every night produced in an hour sound and refreshing sleep for six hours and a half (A. Chaplin).

In a case of double mitral disease with cerebral embolism and delirium (insomnia six weeks), bromides (30 to 60 grains) produced quietness, but no sleep; sulphonal (20 and 40 grains) produced in three hours interrupted sleep for an hour or less, or no sleep at all. There was drowsiness next day (F. W. Burton).

6. *Lung-Disease.*—In a case of chronic bronchitis (insomnia for some months), sulphonal (20 grains) produced in half an hour to an hour sound sleep nearly all night. There was slight drowsiness next day, and giddiness on getting up, but no other bad after-effects (A. Chaplin).

In a case of asthma, chronic bronchitis, and emphysema (insomnia two months), sulphonal (20 grains every other night) produced, for the first three weeks, twelve hours' sound sleep, and the following five weeks only six hours. At first, sleep came on in an hour, but during the last five weeks only after three hours. At the end of the first three weeks the insomnia returned on discontinuing the drug, which had to be given again. There was a feeling of transient muddle next day, but no other bad effect (Dr. Maclure).

The drug was given in eleven cases of phthisis in patients varying in age from 16 to 47 years; the disease was active in all except one, in whom it was quiescent. In six cases insomnia had lasted from three weeks to eight months. Sulphonal (in 15 to 25 grains) was given in nine cases every other night, every third night, or once a week. In most cases the patients slept all night quietly. In one case 15 grains gave only four hours' sleep; in another, three hours. In two cases 10 grains gave a sound sleep all night. The effect came on soonest in twenty minutes (one case), but usually in an hour to three hours. In one case 5 grains was without any effect, except in producing sickness in the morning. Eight of the eleven cases suffered from drowsiness the next day. In one case drowsiness appeared after the effect of the drug was lost. In one case drowsiness appeared early in the case of treatment, and in one case late. Giddiness was noted in four out of the eleven cases.

PARALDEHYDE.

1. *Bright's Disease.*—In a case of granular contracted kidney, with headache and uræmic dyspnœa (insomnia fourteen days), 40 minims every night for three nights produced natural sleep within five minutes, and lasting three to six hours. In a second case of granular kidney with dilated heart, insomnia had lasted some weeks. 50 minims of paraldehyde produced, in fifteen minutes, two and a half hours' sleep; headache then came on, but the patient slept at intervals for three hours during the rest of the night. In another case of Bright's disease (insomnia some

weeks), 1 drachm of paraldehyde caused dozing for three hours, with restlessness; no actual sleep. In a case of Bright's disease, with bronchitis, dilated heart, and cardiac dyspnœa, 1 drachm in 1 hour caused two and a half hours' sleep, with a short interval of restlessness. The patient was dozing, but restless for the rest of the night. In these cases there were no bad after-effects (E. S. Reynolds).

2. *Aneurism.*—In a case of aortic aneurism (insomnia four days), 40 minims, in seven minutes, produced an easy sleep of five hours, with four periods of short duration of wakefulness. No bad after-effects.

3. *Heart-Disease.*—In a case of mitral stenosis (insomnia one month), paraldehyde was given in doses of 40 minims for three nights; then 1 drachm for two nights. The third administration of 40 minims produced no sleep, the second of 1 drachm also failed, and both these caused slight excitement. The other doses caused, in four to fifteen minutes, an easy sleep of two to five hours. Morphine succeeded well after paraldehyde had failed (F. W. Burton).

Double aortic disease and secondary mitral; irregular insomnia for several weeks. Paraldehyde (20 minims) every four hours for fourteen days produced better rest at night, but not continuous sleep. No drowsiness in the day and no bad after-effects (J. S. Short).

In a similar case, with slight insomnia, ½-drachm doses had a slight effect at first, but afterwards lost their power. Sleep was broken, and the patient vomited after one dose. In a case of double aortic disease, with periodic attacks of insomnia, ½-drachm doses every three hours produced in half an hour natural sleep lasting two hours. No bad after-effects (W. Bate).

In a case of mitral disease, with cerebral hemorrhage and dementia (insomnia some weeks), 50 minims in fifteen minutes produced over an hour's sleep; the patient was then awake for four hours, and was very irritable, but slept afterwards for two hours. In this 30 grains of chloralamide produced in fifteen minutes four and a half hours' sleep during the night, with two short intervals of great restlessness.

4. *Rheumatism.*—In a case of chronic rheumatism (insomnia some days), 50 minims of paraldehyde produced over six hours' sleep in the night, with intervals of wakefulness lasting half an hour (E. S. Reynolds).

5. *Lung Disease.*—Bronchitis, with laryngeal catarrh and dementia (insomnia three nights), 2 drachms were given three times. The first time sleep lasted forty-five minutes; the second time sixty minutes, coming on in half an hour. Sleep was restless. On another occasion, 2 drachms gave the patient an hour's sleep; three hours after waking up he had another drachm, and slept for four hours. On the next night, 20 grains each of potassium bromide and chloral-hydrate gave him seven hours' restless sleep (A. Hopkinson).

Bronchitis and dilated heart in an old man (insomnia for some days); 1 drachm caused a restless, irregular sleep for six hours and a half. In a case of pneumonia (insomnia some days), 50 minims caused six hours' very restless sleep, with an hour's interval of waking (E. S. Reynolds).

In a case of quiescent *phthisis*, with chronic bronchitis (insomnia for three months), sulphonal was given for six weeks in 20-grain doses, causing forty-six hours' sleep. The drug, however, lost its effect, and produced only drowsiness. Paraldehyde (40 minims) every night for three nights produced within fifteen minutes a natural refreshing sleep, lasting twelve hours. For one month, during which patient was observed, the insomnia did not return. The drug caused some nausea (Dr. Maclure).

In another case of active double phthisis, 40 minims produced in an hour natural sleep, lasting five hours. There was drowsiness and headache the next day. The second night the same dose produced only three hours' sleep; and on the third night the drug caused no sleep, and was discontinued, owing to the headache and drowsiness (Dr. Maclure).

In a case of phthisis (left apex) with insomnia of ten nights' duration, ½ drachm produced an irregular disturbed sleep, lasting all night. There was giddiness and morning retching, but no other bad after-effects. In another case (insomnia for some weeks), ½ drachm, repeated in two hours, produced, one hour and a half after the last dose, five hours' disturbed sleep in the first night, and six hours on the succeeding nights. There was drowsiness for an hour on awaking, and frontal headache for two hours (A. Chaplin).

URETHAN.

In a case of double aortic disease (insomnia four days), 10 grains of urethan caused in two hours a good sleep for three hours. There was drowsiness all next day and slight headache (J. S. Short).

CHLORALAMIDE.

1. *Bright's Disease; Plumbism.*—In a case of granular kidney (insomnia some days), chloralamide (30 grains) produced during the night nearly eight hours' sleep, with three intervals of fifteen to thirty minutes. The effect came on in fifteen minutes. In a second case of chronic plumbism, with granular kidney and high arterial tension (insomnia several weeks), sulphonal (60 grains) was given with good effect (see SULPHONAL—*Plumbism*). Chloralamide (30 grains) was given on three occasions, producing within an hour good sleep, lasting all night, with a few intervals of wakefulness. The effect, therefore, was better than that produced by sulphonal. In a second case of chronic plumbism, with granular kidney and dilated heart (insomnia some weeks), chloralamide (20 grains once) produced three hours' sleep during the night at long and irregular intervals.

2. In a case of diabetes, with bronchitis and dementia (insomnia some days), 30 grains of chloralamide caused in half an hour a sound sleep, lasting over five hours, with an interval of half an hour's wakefulness. In a case of paralysis from Pott's disease (insomnia some days), 30 grains in half an hour caused dozing, lasting an hour and a half, and with an interval of two and a half hours, sleep lasting two hours. There were no bad effects from any of the doses of chloralamide.

Sulphonal, Urethan, Paraldehyde, and other Hypnotics compared.—In a case of pernicious anæmia in a woman, aged 38, in whom insomnia had lasted several weeks, paraldehyde (50 minims) produced in a quarter of an hour sound sleep for three-quarters of an hour only, the patient vomiting on waking, but with no other bad effects. Sulphonal was given in 30-grain doses on two occasions. Sleep came on ten minutes after the first dose and lasted fifteen minutes; the patient was then restless till morning, when she slept several hours. On the second occasion sleep came on in three-quarters of an hour; the patient was then restless and talkative for an hour, and slept for three hours and a half. Drowsiness followed both doses. To the same patient, after paraldehyde had been tried, urethan (40 grains) was given once. In two hours patient slept for ten minutes; after an hour she slept an hour, and at another interval of an hour for half an hour. The sleep was restless, but there were no bad after-effects. Thirteen consecutive observations were made in this case on the effect of 30 grains of chloralamide given each night. Sleep was produced in one to two hours, and lasted more or less all night, with two or three intervals. On the ninth night patient did not sleep until 10 minims of Batley's solution were given. On the thirteenth night chloralamide produced as good an effect as when first given. The patient vomited after the first dose, but not afterwards, nor were any other bad effects noticed (E. S. Reynolds).

The action of these three hypnotics were also compared in a case of chronic gout (patient aged 42), in which insomnia had lasted for two or three weeks. Urethan (20 grains) the first night gave, after an hour, three hours' restful sleep in the night; a similar dose the second night caused in a few minutes a quiet sleep for four or five hours; and the third night, after an hour, an interrupted sleep for three or four hours. No bad after-effects. 1 drachm of paraldehyde produced in half an hour a quiet, restful sleep of three hours. Sulphonal (30 grains), on two separate nights, produced no sleep, but caused vomiting within half an hour (J. Hervey Jones, M.D.).

Alcoholism: Mania.—In a patient, aged 40, with alcoholism, cirrhosis of liver, and gastric catarrh, insomnia had been bad one week. Urethan (20 grains) produced, in one hour, sleep, which lasted one hour, and continued for three hours irregularly during the night. Sulphonal (10 grains) produced, in half an hour, four or five hours' quiet sleep, without bad after-effects, and was repeated on several occasions, always with good results (Dr. J. H. Jones).

In a case of acute alcoholism (patient aged 40), insomnia had lasted seven days; chloral hydrate (30 grains) and ammonium bromide (30 grains) every four hours produced no sleep, but vomiting after the later doses. Sulphonal (60 grains) produced in three hours seven hours' quiet, refreshing sleep, with drowsiness, but no other bad after-effects. The drug was continued for seven days, and always with good results (Dr. J. Gordon).

In acute and chronic mania and melancholia Dr. John Molony reports that in cases of irregular insomnia, lasting from three nights to a week, bromides, bromidia, urethan, liq. opii sedat., etc., in full doses, produced unreliable effects, but sulphonal, 20 to 30 grains in single doses at bedtime, or 15 grains three times daily, produced, in an hour, two hours and a half or three hours' quiet, refreshing

sleep for four to eight hours; no bad effects were observed.

SUMMARY OF RESULTS.

The results are best summarized under the following headings: 1. Dose or drug given? 2. Whether sleep is produced with certainty, how soon it comes on, and how long it continues? 3. Are there any dangerous or other disagreeable effects produced? 4. Whether the drug loses its effect?

SULPHONAL.

1. *Dose.*—In thirty-two of the cases recorded, 20 grains were given in eleven instances, once at night. Sleep came on in half an hour to three hours; in one case in five hours, and in another in nine hours. A second dose on the succeeding night in one case produced sleep in five minutes. Sleep lasted in four cases all night; in four cases six hours; and in three cases one to two hours. With 25 grains (four cases), sleep came on in two hours, and lasted six hours or all night. With 10 and 15 grains there was less sleep produced, and in a case of pneumonia (15 grains) there was no sleep after the drug. The few cases (seven in all) in which 30, 40, and 60 grains were given, showed that these doses did not possess greater hypnotic effect than a dose of 20 grains. In a case of chronic gout, 30 grains had no effect.

Disagreeable After-Effects.—In six out of ten cases, in which 20 grains had been given, disagreeable after-effects were noted; drowsiness next day was noted six times, giddiness four times, and headache and inco-ordination of gait each twice. In four cases, where 10 grains had been given, drowsiness was noted once; in five cases, with 15 grains, drowsiness was noted twice and giddiness twice; with 25 grains (four cases), drowsiness was noted twice, giddiness once, and headache once. In seven cases, with 30 to 60 grains, drowsiness was noted four times, giddiness twice, headache twice, inco-ordination of gait and vomiting each once.

Whether the Drug loses its Effect?—Several of the cases show that a second dose on the succeeding night has a greater effect than on the first night. Thus, in one case, 20 grains produced, on the first night, two hours' sleep with no bad after-effects; on the second, a similar dose produced eight hours' sleep, with drowsiness, giddiness, and inco-ordination of gait on the following day. In some cases prolonged use of the drug appears to diminish its effect. Thus, in one case (asthma and bronchitis), 20 grains was given every other night for eight weeks. During the first fortnight sleep came on in an hour and lasted twelve hours each night. The drug was then omitted for a week, when the insomnia returned. In the succeeding five weeks the drug, after three hours, produced six hours' sleep. In a case of phthisis, 20 grains was given every other night for twenty-six days, except for five days, when the dose was reduced to 10 grains, but afterwards was increased. During the time the patient was taking 20 grains, after an hour, he slept for four to six hours. The drug was omitted for a fortnight, and, on recommencing it, it produced only drowsiness, and no sleep. In the case of neurasthenia and insomnia, quoted by Mr. Priestley (see *antea*), sulphonal, 10 to 20 grains, did not lose its effect during six months.

PARALDEHYDE.

Single doses of 40 to 60 minims (fourteen cases) produced sleep in five to fifteen minutes; in two cases in half an hour; in one case in an hour. In most cases the sleep was wakeful and restless, and lasted very varying times, in one case only three-quarters of an hour, in another case there was restless dozing for three hours, in another sleep for two hours; in ten cases sleep lasted from three to six hours, and in one case sleep for twelve hours. These results refer to single doses. ½ drachm every three hours produced within half an hour two hours' sleep; 20 minims every four hours for fourteen days produced better sleep at night, but not during the day.

Disagreeable After-Effects.—Giddiness and drowsiness were noted each once, vomiting three times, and retching and nausea each once.

Tolerance of the Drug.—In a case of mitral stenosis on two nights 40 minims gave two to five hours' sleep; on the third night a similar dose had no effect; on the fourth night 1 drachm was satisfactory, but on the sixth night it produced no effect. When the paraldehyde failed it seemed to produce slight excitement. Morphine succeeded well afterwards.

CHLORALAMIDE.

In one case 20 grains, and in six cases 30 grains, were given in single doses. After the 20 grains, sleep came on in twenty minutes and lasted three hours, with half an hour's interval of waking; after 30 grains, sleep came on in fifteen minutes to half an hour in four cases; in one to two hours in two cases.

Sleep lasted all night in three cases, in two cases four to five hours, and in one case there was two hours' dozing, then an interval of wakefulness, and then two hours' sleep.

Disagreeable After-Effects.—None observed.

Tolerance of the Drug.—Thirteen consecutive observations were made in a case of pernicious anæmia, with several weeks' insomnia. 30 grains of chloralamide failed once on the ninth night; on the other nights the drug produced, in one to two hours, restless sleep, lasting all night, with two or three short intervals of wakefulness.

TRACHEAL INJECTIONS AS A MODE OF MEDICATION.

At the meeting of the Academie des Sciences, held July 21, 1890, Dr. Botey, after alluding to the rapidity of absorption, determined by Colin, of liquids injected into the bronchial tubes, reported a number of experiments which he himself had made in this connection (*La France Médicale*, August 1, 1890).

He stated that he was warranted in attempting such experiments on man by the fact, long ago observed by Bichat, of a nutritive injection, which it was desired to introduce into the stomach by an œsophageal tube, but which was accidentally injected into the lungs, and which, without producing any accident, was rapidly absorbed.

Bouchard, likewise, has performed a number of similar injections on the rabbit, and stated that they were perfectly harmless, and that absorption was rapidly produced.

Dr. Botey performed a number of experiments, in the first place, on rabbits, and found that scarcely any disturbance of respiration or serious trouble was produced until the tracheal injection exceeded fifty drops; though even then, when the animals were killed, post-mortem examination failed to reveal any alteration of the respiratory tract. In one case, however, death rapidly followed the injection in a small rabbit of a little over a drachm of water into the trachea, the symptoms being accompanied by œdema and congestion of the lungs, with an effusion of bloody froth into the bronchi. A number of astringent injections were then performed on rabbits (one-half per cent. of nitrate of silver, one-half per cent. of bichromate of potassium) without any serious accident being produced.

The author then passed to experiments made on himself, since he possessed the power of observing his own larynx. He first produced a certain amount of anæsthesia by a solution of cocaine, and then, by means of a laryngeal mirror, introduced a syringe provided with a long, appropriately curved canula, and injected 160 minims of distilled water into the trachea. Not the slightest discomfort was felt, nor was the least cough produced, and after repeating this experiment for a number of successive days, he found only that the respirations were reduced to 17 instead of 21, and that the pulse was reduced to 74 instead of 82. Three or four days later he employed a still larger quantity of water, until he found that he could administer more than two syringefuls into his trachea without producing any cough, though again he found that the number of respirations steadily decreased and the pulse-rate was lowered for several hours. Passing then to his clinical experiments, he alludes to the case of a woman suffering from syphilis of the larynx and trachea, in whom he injected about 3 drachms of an iodated solution without producing any cough, even although the larynx had not been anæsthetized. So also corrosive sublimate was employed, as well as the iodide of potassium, the injections being administered ten times successively, the patient supporting this mode of treatment extremely well, and was cured of her affection, although previous internal treatment of the most energetic character had been without avail. Here also he noticed that the number of respirations were reduced from 24 to 18 for a number of hours after the employment of tracheal injections.

A PROCEDURE FOR WASHING OUT THE MALE BLADDER WITHOUT THE USE OF A CATHETER.

Dr. Rotter describes, in the *Centralblatt für die Gesammte Therapie*, July, 1890, a method for washing out the male urinary bladder without the use of the catheter, by which the introduction of infectious germs into the bladder by the catheter is thus avoided. The author employs a rubber tube attached to an irrigator filled with lukewarm antiseptic fluid, on the end of which is a mouth-piece, wrapped with antiseptic gauze and covered with vaseline, to render its insertion into the orifice of the urethra more readily performed. The tube is filled with liquid, and air allowed to escape, and then inserted for about half an inch within the urethra. Immediately before the operation the patient

must first empty the bladder, and is then placed upon his back, with the legs separated and flexed upon the pelvis, the hips being somewhat raised; the end of the tube is inserted into the urethra, and held fast with the fingers, and the fluid allowed to enter. Within one or two minutes, it is stated, the sphincter of the bladder relaxes, and, after three minutes, the liquid enters the bladder.

The pressure may be regulated by the height to which the irrigator reservoir is elevated. After the removal of the tube, the patient may readily empty his bladder of the fluid introduced, which may amount to a pint or more.

THE SURGICAL TREATMENT OF TUBERCULOSIS OF THE PLEURA AND LUNG.

At the Congress of German surgeons held this year at Berlin, PROFESSOR TILLMANNS showed a patient whom about two years previously he had completely cured of severe tuberculosis of the left pleura and left lung by extensive resection of the front part of the left chest-wall. The tuberculosis of the left pleura and left lung was made accessible for purposes of local surgical treatment by removal of the fore part of the left chest-wall, which was also affected with tubercular disease. The heart was displaced to the right behind the sternum as the result of an empyema of more than two years' standing. After the cure of the tuberculosis of the left pleura and the left lung, Dr. Tillmanns converted the left pleura into a cutaneous cavity by transplantation of skin according to Thiersch's method. The healthy right lung and the heart, which still remains displaced to the right, now act so well that the patient, in spite of the loss of his left lung, has since about September, 1888, been able to attend to his business as a merchant quite in the same manner as before. The author's observation is of interest with reference to the operative treatment of tumors and other diseases of the pleura and lung, and in the *British Medical Journal* for June 14, 1890, he reports the case referred to above, adding some remarks on the surgical treatment of diseases of the lung and pleura.

In the first place, with regard to the history of the above-mentioned case, the following are the chief points: The patient, who is now 28 years of age, came under care on April 19, 1888. He presented the appearance of one in the last stage of phthisis. The left lung was phthisical to a high degree, the pleura being firmly adherent in its upper third; in the sputum numerous tubercle-bacilli were found. In the two lower thirds of the left pleural cavity there was an empyema, which had been in existence for two years and a half; several fistulæ traversed the left front chest-wall, which was also the seat of tubercular disease. As a result of the left-sided empyema, the heart was dislocated to the right behind the sternum. The right lung was comparatively healthy and acted well. In the middle of October, 1885, the patient became affected with serious left-sided empyema, and after that time (that is to say, for more than two years and a half) he was, with few exceptions, confined to his bed.

In November, 1885, about three litres of pus were removed by means of puncture (thoracocentesis). In September, 1886, and January, 1888, thoracotomy, with resection of a piece of rib at the lower and hinder part of the thorax, was performed by a practitioner in Saxony. When the patient came under Dr. Tillmanns's care in April, 1888, he first sought to cure the existing left-sided empyema by means of extensive rib resections,—from the second to the sixth rib on the left side in front, and of the seventh, eighth, and ninth ribs on the left side behind,—of course with slight hope of success, since the left lung was already the seat of serious tubercular disease. As the patient was becoming steadily weaker, and had no prospect but that of a speedy certain death before him, he determined to expose the tuberculosis of the left pleura and left lung by extensive resection of the anterior part of the tubercular left chest-wall,—ribs as well as soft parts,—and subject it to energetic local treatment. In this manner the left lung would certainly be placed completely, and probably forever, *hors de combat*, and the patient would have to be contented with the work of his right lung alone. But the left lung was extensively diseased, and had been functionally incapable for months, and the patient had, in fact, been for months entirely dependent on his healthy right lung. By too long waiting the right pleura and right lung would also become tuberculous. On May 27, 1888, therefore, the front part of the left chest-wall, tuberculous and riddled with fistulæ as described, was resected *in toto* for an extent of from five to twelve centimetres, from the second to the sixth rib, close to the left sternal border. The breadth of the portion of the thoracic wall re-

moved was five centimetres at the upper part; it became wider from above downward, and measured twelve centimetres in breadth at the lower part. The whole of the left pleura was tubercular to a high degree; the left lung was phthisical, and only as large as a man's fist, and was firmly adherent at the level of the first rib. The left lung was partly covered by a pedunculated skin-flap taken from the thorax, in such a manner, however, that it remained accessible to local treatment. The left pleura was energetically scraped with a sharp spoon, and then stuffed with iodoform gauze. On June 22 the left pleura, after repeated previous scraping with the sharp spoon, was converted into a cutaneous cavity by transplantation of skin according to Thiersch's method. Local treatment of the left lung proved unnecessary in the further course of the case. The organ shrank together steadily more and more, and the tuberculosis, of which it was the seat, underwent a process of spontaneous cure in consequence of this shrinking. The patient was discharged cured on July 23, 1888. He has remained quite well up to the present time. He can attend to his business as a merchant as before his illness, and presents a blooming appearance. When Professor Tillmanns saw him again for the first time some time ago he did not recognize him at the first glance, so stout had he become. The left lung, entirely collapsed, could be felt in the upper part of the left side of the thorax, at the level of the first rib behind the flap of skin which partly covers it; it is quite inactive. The right lung is absolutely healthy; the heart is still displaced to the right. The left pleura is a skin cavity of the size of a man's fist, and covered with epidermis. In speaking and on deep inspiration the mediastinum is arched to the left. At the lower part of the mediastinum—that is, the median wall of the skin cavity—the movement of the heart can be seen and felt. The strength and movements of the left arm are not impaired, but perfectly normal.

The author recommends that in similar severe cases of one-sided tuberculosis of the pleura and lung, the same procedure should be adopted as carried out in the case related,—that is to say, the seat of disease should be exposed sufficiently for local surgical treatment by free resection of the chest-wall in front or behind. In suitable cases the performance of a temporary resection of the chest-wall may be recommended. A pedunculated flap of skin and bone is formed, and turned back, and afterwards, when the disease of the pleura and lung is cured, the thoracic coverings are placed in their original position. One can also proceed in such a manner that, after extensive resection of the ribs, the soft parts in the chest are divided in the direction of the lung, the two flaps of soft tissues drawn apart with wound hooks the pleura and lung subjected to adequate local treatment, and then the soft tissue flaps united to the pleura by compression. In the above related case Dr. Tillmanns was obliged to remove the anterior part of the left chest-wall *in toto*, as it also was extensively diseased.

The case teaches further the manner in which unilateral tumors of the pleura and lung may best be removed. In these cases, likewise, the pleura and lung should be exposed by total or temporary resection of the chest-wall, or by resection of ribs, with division of the soft parts of the thorax in the direction of the lung; and then, later on, by a second operation, the diseased lung, which is by this time collapsed, should be removed, and the tumor extirpated or destroyed with Paquelin's thermo-cautery.

Recently the author states that he has also treated pulmonary phthisis by injections of iodoform glycerin and iodoform oil. He uses ten per cent. sterilized mixtures of iodoform glycerin or iodoform oil, which he injects into the lungs to the amount of five grammes, with antiseptic precautions, through an incision in one of the intercostal spaces. He has not found it advantageous to inject more than five grammes. At first he made the injections under chloroform narcosis; now he makes them without an anæsthetic. Beyond ordinary dyspnœa, which quickly passes away, he has seen no injurious effects. He always makes the injection into one lung only, never into both at the same time, and usually performs the injections at intervals of from one to two weeks; in slighter cases he makes them every three or four weeks. With regard to the real advantages of these injections of iodoform into the lung, he cannot as yet make any positive statement. What he has seen up to the present, however, encourages him at all events to continue the treatment of pulmonary tuberculosis by injections of iodoform.

ECZEMA FROM THE USE OF CREOLIN.

Quite a number of cases have recently been reported in which more or less unfavorable results have followed the employ-

ment of creolin, in the majority of cases the effects being attributable to the phenic acid and its derivatives in this proprietary remedy. In the *Gazette Médicale de Paris*, No. 29, 1890, a report is published of a case observed by M. BOREHMEYER of a child, 2½ years of age, whose finger was crushed between cog-wheels, by which a severely contused wound was produced, which was treated by applications of a one and a half per cent. solution of creolin. On the fourth day the finger was covered with vesicles, both small and large, which ruptured spontaneously, giving issue to a yellowish liquid. The eruption soon disappeared from the injured hand, and, on the removal of the application, a cure was rapidly produced, though the eruption again returned on renewed application of creolin. So also Dr. Wackez publishes an account of seventeen different surgical cases treated by creolin. In ten of these, union by first intention occurred; in seven the creolin produced eczema, erythema, and vesicular eruptions, and desquamation of the skin in large patches; at the same time the patients had more or less severe constitutional disturbance, and an examination of urine showed that these poisonous effects were attributable to the presence of phenol. It would seem, however, that children are especially susceptible to the deleterious effects of phenol and its derivatives, and hence are more readily influenced by creolin.

CREOSOTE IN PHTHISIS.

From a careful study of the literature and his own personal experience as to the dosage and mode of administration of creosote in phthisis, DR. WM. H. FLINT draws the following conclusions (*New York Medical Journal*, July 26, 1890):

1. That intrapulmonary and intratracheal injections of creosote are of doubtful utility, and may be positively injurious.

2. That, for administration by mouth or rectum, solutions and emulsions of creosote are preferable in most cases to capsules, pills, or wafers.

3. That milk is an excellent vehicle for the administration of creosote in solution or in emulsion.

4. That each method of administering creosote used by the writer—viz., by inhalation, by mouth or rectum alone, and by both these channels simultaneously—is useful, and may each be particularly adapted to individual cases. In suitable cases the most rapid progress seems to be made when all these ports of entry are utilized.

5. That the best results for each individual attend the administration of the maximum quantity of creosote which this patient will bear.

6. That the average patient will not easily tolerate more than ten or fifteen minims of creosote per diem for any great length of time, and that many will only bear two or three drops per diem continuously administered.

7. That it is very important that the treatment be uniform and uninterrupted.

8. That, consequently, an effort should always be made, if intolerance of creosote is shown by any one mucous surface, to employ some other channel of introduction, in order that the continuity of the treatment be not interrupted.

IODOSULPHATE OF CINCHONINE.

When iodide of potassium is added to a watery solution of a salt of an alkaloid, a voluminous precipitate is formed, which consists of a combination of the iodine and the alkaloid.

Bouchardat, who discovered and studied these combinations in 1845, designated them under the name of the iodides of the iodohydrates of the alkaloids, but it is now known from the investigations of Herapath that these combinations contain sulphuric acid, and they are now designated under the name of iodosulphates.

All of these combinations, no matter what may be the alkaloid employed, contain a large proportion of iodine, and in *La Progrès Médicale* for July 12, 1890, M. YVON publishes a paper on some studies made with the iodosulphate of cinchonine, which he terms "antiseptol," and recommends as a substitute for iodoform on account of its low price. From a chemical point of view, the iodosulphate of cinchonine was studied in 1826 by Jorgensen, of Copenhagen. He described three combinations of iodine with the sulphate of cinchonine. These combinations are perfectly definite and crystalline.

For therapeutic use the preparation of the iodosulphate of cinchonine is extremely simple. The sulphate of cinchonine is dissolved in water, 25 parts to 2000, and then precipitated by the solution of iodated iodide of potassium, or Bouchardat's reagent, which consists of 10 parts of iodine, 10 parts of iodide of potassium, dissolved in 1000 parts of water. In the addition of these reagents, excess should

be carefully avoided, and the solution should be allowed to retain a little sulphate of cinchonine. The voluminous precipitate formed by its addition may be collected on a filter, and washed until the washings no longer contain free iodine. In drying in the air the iodosulphate of cinchonine is obtained as a definite product, containing fifty per cent. of iodine, and may be obtained in a crystalline form.

The amorphous form, as obtained above, is, however, perfectly applicable for therapeutic employment. It occurs in the form of an impalpable powder, without odor, without color, insoluble in water, but soluble in alcohol and chloroform. It may be employed, according to Yvon, in all conditions where iodoform is indicated, and he states that, in the trials which he has made of this substance, it seems quite as efficacious as iodoform, and may be readily prepared by any pharmacist.

ANTISEPTIC CURETTING OF THE UTERUS IN PUERPERAL ENDOMETRITIS.

Dr. E. Braun (*Arch. f. Gyn.*, B. xxxvii., H. 3) reviews some of the prevailing opinions with reference to the bacteriology of puerperal fever. He believes with Kehrer that three groups of germs are concerned in the etiology of child-bed fever,—viz., pyogenic, septogenic, and saprogenic micro-organisms. In other words, he holds that puerperal fever may be pyæmic, septic, or sapræmic. The latter or putrid form he thinks the most common.

Charpentier regards septic endometritis as the principal initial form of child-bed fever. After curetting and douching the uterine cavity he mops it with creosote and glycerin.

Of seven thousand six hundred puerperal cases at Vienna, one hundred and one were curetted, ninety-six recovered. Of the five fatal cases, three were considered septic rather than sapræmic.

The Vienna method is as follows: The patient is placed in the Sim's position, the external genitals cleansed, and the vagina and uterus irrigated with a thymol solution before and after curetting. A finger-thick iodoform-pencil is dipped in tincture of iodine and left in the uterus. Vaginal tears and abrasions are touched with tincture of iodine. The cervix and vagina are lightly tamponed with iodoform gauze. The patient is given a dose of cognac, and an ice-bladder is applied over the abdomen. A vaginal douche of thymol solution is used once daily. The fever subsides in from one to six days. Parametric inflammation had not been observed as a result of the curetting.

Curetting is indicated when a septic condition of the endometrium is announced by fever, faulty involution, and fetid lochia. It is useless after the infection has become general.—*Brooklyn Medical Journal*, August, 1890.

PARAGUAY TEA.

Paraguay tea, also called maté or Yerba maté, from the name of the cup in which it is infused, consists of the dried leaves of the Brazilian holly (*Ilex paraguensis*). This plant is most extensively used in South America, and is said to possess many of the good qualities of tea, though a long indulgence in its use has been stated to induce diseases similar to those following the abuse of alcoholic drinks. In South America the tea is first placed in a maté, in which it is well shaken, a little warm water is then added, and the leaves stirred up; the gourd is then filled up with boiling water, and in a short time the liquid is ready for drinking, being stirred from time to time, and more hot water added as necessary; on account of the slowness with which exhaustion occurs, care is taken to prevent the loss of the aroma by never letting the infusion cool down.

In the *British Medical Journal* for July 26, 1890, Dr. T. Cranstoun Charles writes that he has lately made several chemical examinations of this body, as he finds that the analyses published of it varied very greatly. The alkaloid present is caffeine, identical with the caffeine found in tea and coffee; there is also a tannic acid present in large amount. Comparing the analysis of maté with tea and roasted coffee, the following results were obtained:

	Caffeine. Percentage.	Tannic acid. Percentage.	Ash. Percentage.
Tea.....	3.1	22.7	5.8
Roasted coffee	1.2	5.8	4.6
Maté	0.79	21.9	4.1

Both the active principles of these bodies appear to be the same, yet they seem to act somewhat differently on the system, and it should be remembered that their action is not dependent alone upon their proportion of alkaloid, but also on the presence of other bodies in small amount, such as volatile aromatic oils, empyreumatic products, and the like.

Dr. Charles made a number of experiments upon himself and a friend with the alkaloid, which he separated from the maté, and he found by the stethograph that, with doses of 1 to 3 grains,—

1. The respiration was first hastened and then made slower, while an exhilarating effect was likewise produced.

2. Slightly increased vascular tension as indicated by the sphygmograph showed itself soon, but a variable time, after the ingestion of the drug; it lasted a considerable time, varying, however, according to the dose, and when the blood-pressure sank apparently to normal or below it, it was followed later by another slight rise.

3. With small doses (½ grain) the contractions of the heart, as indicated by a Marey's tambour at the apex, and a continuous sphygmographic tracing, became slower and stronger. But with a dose of 4 grains the action became more frequent and irregular.

4. The urine passed for the two hours after taking 3-grain doses of the alkaloid, as compared with that passed in the two hours previously, showed a very slight increase in the urea and phosphoric acid eliminated, but a further more marked increase occurred some time later. The same conditions, as far as possible, were observed as on the two preceding days, when the same experiments were made at the same time without any alkaloid. Both the quantity of the urine and the total solids were slightly increased.

5. A strong solution applied to living excised muscle of the ordinary grass frog (*Rana temporaria*) produced a state of rigidity very closely resembling that induced by heat, no increased irritability showing itself however.

When strong solutions of the maté tea were taken, it was noticed that,—

1. The respiration seemed to be slightly accelerated, but continued easy and tranquil. An estimate of the carbonic-acid gas expired was made by comparing the increase in weight of a caustic potash apparatus after an hour's expiration through it,—the nose being clipped,—with the increase occurring under the same conditions as far as possible as to food, time, and surrounding temperature, but, after the ingestion of the maté, there was an undoubted diminution noted in the carbonic acid gas expired.

2. The blood-pressure was at first slightly raised, with slowing of the pulse; it then fell slightly, and the pulsation increased from 75 to 83 per minute.

3. The heart's action was rendered slower for some time and then accelerated, but was readily slowed again by the passage of an electric current along the line of the vagus in the neck.

4. The urine was apparently increased in quantity and was passed with greater frequency. The urea was determined every hour for four hours. Its elimination, as well as that of the phosphoric acid, was diminished, but ultimately slightly increased, the increase, however, being less marked with the phosphoric acid.

Both maté and its alkaloid were given for some time to three young men who undertook long walks and very long cycling rides. The experiments made upon them under similar conditions were of a most varied kind, but the general results appeared to be that the tissue waste was to a large extent retarded; that with little or no previous preparation long journeys and most arduous tasks could be undertaken without any apparent after-evil consequences; that the restorative effects in states of mental and physical exhaustion were well marked; and that these sustaining and recuperative properties were retained. Further, that the chief results obtained were constant and rarely variable, and that the digestion itself was stimulated, new life and sustaining power being imparted to the system.

But even from comparatively limited experience maté and its alkaloid seem to act somewhat differently in different individuals, in some the muscular, in others the nervous, and in others again the digestive system being chiefly affected.

Maté accordingly appears to act as a cerebral stimulant, and also to have a special action on the sympathetic system, the contractions of the cardiac muscle being increased as well as those of the unstriped muscle of the bladder and intestine; and the whole muscular system seems to be stimulated by it to increased labor and wakefulness.

As regards the therapeutics of maté, but little has yet been determined, although Dr. Charles states that in the instance of two old ladies who were great tea-drinkers, and who used to suffer much from sleeplessness, headache, and constipation, the use of maté had after a week produced great improvement. They slept well, passed more urine, their bowels became regular, and they suffered no more from headaches. It is also stated by Dr. Charles to have been serviceable

in relieving patients who suffered from severe nervous headaches generally associated with constipation, and with whom tea and coffee appeared to disagree.

TREATMENT OF DIPHTHERIA BY INOCULATION WITH THE MICROBES OF ERYSIPELAS.

In the *Rèpertoire de Pharmacie* for July 10, 1890, it is stated that DR. BABCHINSKI was attending a case of grave diphtheria occurring in his own son, in which a rapid change for the better occurred coincidentally with the appearance of erysipelas on the face. The fever rapidly fell, the false membrane disappeared, and cure rapidly took place. Dr. Babchinski also states that in several other cases he noted a great improvement coincident with the appearance of erysipelas, and in one of them the erysipelas occurred on the leg and not on the face. These facts suggested to Dr. Babchinski the idea of inoculating diphtheria cases with blood taken from patients suffering from erysipelas, and he states that in several cases in which he employed this procedure cure resulted. Later on he practised inoculation of other cases of diphtheria with cultures of the microbe of erysipelas in agar-agar, and likewise noticed the disappearance of the symptoms of diphtheria. He further adds that when the inoculations were made all special treatment was suspended, and in no case did the erysipelas present any sufficient gravity to cause uneasiness. He concludes by stating that, if his observations and experiences are confirmed, this treatment should rob diphtheria of all its dangers.

Reviews.

A TREATISE ON ORTHOPÆDIC SURGERY. By Edward H. Bradford, M.D., and Robert W. Lovett, M.D. New York: Wm. Wood & Co., 1890.

This work, as stated by the authors, is not confined to the consideration of orthopædic surgery alone, but is much more comprehensive, including those causes or affections which may possibly result in some deformity, and are the primary exciting diseases which later come strictly under the head of orthopædics. It is, therefore, evident we have here a work in which the scope is far more extensive than in other works on this subject. From such an extensive view of the term orthopædics, it is very manifest that many affections must be included that would not properly come under this heading, and to the general practitioner of surgery such a view must be very acceptable, since in his practice he has often found that the only way of practically treating many deformities is their early recognition, long before the deformity is apparent, therefore this combination of our authors is a most judicious one, and one, we think, that will prove of great assistance in the study of orthopædic surgery.

The consideration of Pott's disease, which includes the first chapter, is a very full and very satisfactory study of this affection. The etiology is said to be a tuberculous osteitis, and the exciting cause often some form of traumatism. Upon this question of etiology we would have liked the authors to have been somewhat more positive in their opinion; while they evidently are inclined to the tubercular view, and in places write to this effect, they again give the impression of doubting its absolute truth, stating "that the disease is of a tuberculous nature is frequently asserted and seems probable." The section on the symptoms we have found to be most comprehensive, and shows a careful study of the affection. The one constant and important indication of the presence of Pott's disease has been found by the authors to be muscular rigidity, other signs may be noticed, but their presence or absence are not positive indications, and they are only of relative importance, while muscular rigidity is said to accompany all cases of the disease. The symptom of tenderness on pressure over the spine, which is by most writers thought to be always present, and, indeed, has been generally looked upon as certain indication of this affection, the authors write, "is almost never present." Upon this point we believe the experience of many surgeons will not accord with their opinion. We, at least, have generally sought for and frequently found this symptom.

The treatment in cases of "Pott's disease" is truly said to be simple, but its practical application is found to be most difficult. The indications are to remove pressure and prevent motion; upon the carrying out of these principles will depend the success of the treatment, and it is to this end that all appliances and methods lead. The experience of the authors, and in which we fully agree, is that the choice, practically, of accomplishing fixation and obtaining suspension is by one of two methods,—viz., the plaster jacket and

its modifications, or the posterior steel brace, and of these two, that of the antero-posterior support is given the preference. They write: "Having had a somewhat extended experience in the treatment of Pott's disease by both the plaster jacket and the antero-posterior support, the writers are desirous of expressing their preference for the latter in all cases where it is obtainable, except in those cases of low dorsal caries and in cases with a serious lateral deviation of the column, as previously explained. In saying this they do not intend in any way to throw discredit upon the plaster-jacket treatment, which is a very efficient one, and only suffers by comparison with a more efficient method, which is to be found in the antero-posterior support." To the above conclusion we also fully acquiesce, stating, however, that no one method is applicable to all cases. Each case requires a special study, and that treatment adopted which will best fulfil all the indications to obtain a satisfactory result. In regard to the direct surgical interference in cases of Pott's disease, which operations are of recent date, the authors write: "That resection of the laminæ of the vertebral column is an operation which is attended with some risk of a fatal result. . . . The operation, however, has no place in the treatment of Pott's disease until the conservative measures have been faithfully tried over a sufficient period of time, measures which, in most cases, will prove efficient and successful in the relief of the paralysis."

Lateral curvatures of the spine are quite fully considered in all their aspects, and a very interesting series of experiments are given in order to demonstrate that superincumbent weight could cause the change, which chiefly consists of a twist of the spinal column, "with such alterations of the different vertebræ as would follow such a twist, provided the bony structures were unable to sustain such a downward pressure." The choice of methods of treatment in these affections are summarized as follows: 1, postural; 2, gymnastic; 3, by recumbency; 4, methodical correction; 5, mechanical; the selection of the method of treatment depending upon the patient's condition and state of the curvature.

The chapter on "The Pathology of Chronic Joint-Disease" is well written, and comprehends the most recent views pertaining to this subject. Degenerative osteitis of the ends of the bones, especially in children, is, we believe, correctly considered to be a tubercular affection. Scrofulous joint-disease, tuberculosis of joints, chronic articular osteitis, and the term "caries" of the joints are all classed as tuberculous osteitis. The original infection, by means of the tubercle-bacillus, is believed to be through the blood-vessels, although the lymph channels may sometimes probably be to blame. As to the etiological factor of the tubercle-bacillus, the authors' conclusions are "that in most cases of chronic joint-diseases of the character just described, tubercle-bacilli are present, but that the examination for them is difficult; and, moreover, that they are present in small numbers at the late stage, when most examinations are made; probably in the stage of invasion examination of the tissues would show many more." The question as to the identity of tuberculosis and scrofula, notwithstanding its very great interest, the authors refrain from giving us their opinion and those of Mr. Marsh, and refer to Mr. Treves for a discussion of the relation of scrofula and tuberculosis.

Hip-disease receives the extended and full consideration necessary for the perfect understanding of this frequent affection. The pathological condition most commonly found is stated to be a chronic osteitis of the epiphysis of the head of the femur, and the point of original disease is thought to be of osseous origin in children, while in adults an initial synovitis is believed to be more common. The symptom of lameness, or a limp in walking, is considered by the authors of more diagnostic value, in the very early stage of the affection, than pain; indeed, pain is looked upon as a very unreliable indication of the condition. Thus, it is said: "*Pain may be absent at any or all stages of the disease, and is not a diagnostic sign for or against the presence of hip-disease.*" An exception, however, is made in regard to "night cries" or pain, which are to be met with at an early stage of the affection. Muscular fixation is a symptom considered to be of great diagnostic value, and the methods of demonstrating its presence are well described. The treatment of abscesses, in connection with hip-disease, advised by the authors, is that which we have always found, in our own practice, to be most satisfactory,—viz., incision and drainage, with complete antiseptic measures. Aspiration we have found only to lengthen the time of treatment and to be of very doubtful utility. In making the comparison between excision and non-operative methods of treatment of hip-disease, the conclusion reached by the authors

is quite in accord with the experience of our own practice,—that is to say, the careful carrying out of conservative methods and strict attention to details give better results in the majority of cases. Again, excision is only to be resorted to in exceptional cases. It may be classed as a life-saving procedure, and its adoption is only justifiable in those cases which are unusually severe, and where conservative methods cannot be employed satisfactorily. The principles of treatment given by the authors may be briefly stated to be fixation with recumbency; yet each case is to be studied separately, and not the employment of any one splint or method, but such means as meet the indications as they are presented.

In the treatment of tuberculosis of the knee-joint, the same conservative methods are advised as in hip disease. "Excision is not an advisable method of treatment until mechanical measures have proved inefficient after a faithful trial, and the same is true of arthrectomy." Many surgeons will not accept this opinion, and believe that a more rapid and satisfactory result may be obtained by early operative interference.

The deformity "club-foot" is stated to be usually a congenital one, but occasionally is met with as a result of infantile paralysis and after accidents. The etiology of the congenital variety is thought not yet to be definitely determined. The various theories are given, and the conclusion reached is, "that we are entirely ignorant of the causation of club-foot, and unable to give a reasonable satisfactory explanation of the phenomena of its development." In regard to the treatment of club-foot, the authors believe that "few procedures in surgery are as precise in their indications and as certain in their results as the methods for the correcting of club-foot." The indications are very manifest,—viz., correction of the distortion and retention of the foot in a corrected position. To obtain these results the experience of the authors has led them to adopt the following conclusions:

"1. That the cases of infantile club-foot can, as a rule, be thoroughly and efficiently treated without tenotomy by mechanical correction and mechanical retention alone. Tenotomy, however, is an aid, even in infantile cases.

"2. That in older cases tenotomy aids the correction, and is not injurious in the permanent result.

"3. That, as a rule, resistant cases of the severest type can be corrected without tarsal osteotomy by forcible rectification.

"4. That in exceptional cases of resistant club-foot tarsal osteotomy may be needed for perfect rectification, and is not only justified, but may be indicated in exceptional cases."

The question as to immediate or gradual correction after the operation of tenotomy, in cases of club-foot, is, we think, very properly decided in favor of the former. The possibility of non-union of the tendon, being considered theoretical rather than practical, and by the immediate rectification and overcorrection of the club-foot, much time is saved, while the treatment of club-foot, in older patients, by the method of tarsal resection, is thought to be occasionally advisable, yet the operation is not recommended, owing to the mutilation of the foot necessary in its performance.

The constitutional disease rickets, due, it is thought, to malnutrition, is among the affections considered in the book, owing to the deformities which so frequently result, and which demand surgical treatment. The constitutional treatment of the affection is first preventive, and consists in proper feeding; yet it is correctly stated that no rule can be definitely laid down as to what food may or may not cause rickets. That which imperfectly nourishes the child is evidently an exciting cause of rickets, and should be discontinued. Drugs are by the authors believed to be of secondary importance to careful regulation of the diet and hygiene, yet they are not to be neglected. Phosphorus, which has been associated so strongly in the treatment of this disease, has not, in their experience, proved very satisfactory. The syrup of the iodide of iron they have found to yield better results, in conjunction with careful hygienic treatment, than any of the phosphorous preparations.

The resulting deformities of rickets,—knock-knee and bow-legs,—when occurring in early childhood, are thought to be almost always associated with general rickets. When these deformities occur later in life, the affection is not thought to depend upon the disease rickets, but may be due to a feeble physique, muscular paralysis, fractures, and destructive osteitis. The treatment of the deformity knock-knee is divided into expectant, mechanical, operative. In regard to the first, the authors consider it to be very limited in its scope, and only to be employed in the mildest cases in young children. The careful carrying out of hygienic measures and constitutional treatment must always be minutely observed when the ex-

pectant method is adopted. Mechanical treatment by apparatus aims at the gradual correction of the deformity, and in suitable cases very brilliant results have been obtained by the authors. Its great objection, however, is the time necessary to secure a cure, and also the difficulty of securing the co-operation of the parents. The operation of supra-condyloid osteotomy of Macewen is advised, and is believed to be superior to all other operations for the relief of this deformity.

The deformity bow-legs is a condition in which the angularity of the knees is opposite to that of knock-knee. Why this form occurs and not knock-knee has been the cause of much discussion, which our authors do not decide, but are inclined to believe with Mr. Lane that there is a rotation forward of the sacrum, which occasions a rotation backward of the pelvis, thus shortening the ilio-femoral ligaments, and necessitates flexion of the thighs in the erect position. As in knock-knee, the treatment is divided into, 1, expectant; 2, mechanical; 3, operative. They, however, believe that the expectant method is of much greater value in bow-legs than in knock-knee, and that a large percentage of cases under this treatment give favorable results. It is advised, "in the case of babies, the expectant plan of treatment is the one to be followed at first. . . . If, after two or three months, the deformity is found to be increasing or stationary, mechanical treatment must be begun." "Mechanical treatment is based upon the principle of drawing the knee inward to a rigid or elastic rod, which has counterpoints for sustaining outward pressure at the upper part of the thigh and the ankle." In regard to the form of apparatus used to accomplish this end, the authors state that the appliance which best fulfils its object is the one to be employed. The adoption of mechanical treatment after the bones have become thoroughly ossified is, of course, useless, and it now becomes necessary to resort to some form of operative treatment. The operative procedures are divided into osteoclasis, osteotomy, and osteostomy. The choice between these different operations is said to depend upon the nature of the case, and no rules can be laid down as suitable for all.

Congenital deformities, congenital dislocations, infantile spinal paralysis, cerebral paralysis of children, flat-foot, and functional affections of the spine and limbs, are, with the above-noticed subjects, included in the work, and altogether they make a volume of orthopædic surgery for reference, study, or practical application not excelled in the English language. The illustrations are numerous, and add much to the value of the book, but from an artistic point of view they are bad, very bad. J. H. C. S.

Correspondence.

PARIS.

(From our Special Correspondent.)

Rome, the next Medical Congress Meeting-Place—Therapeutic Value of Strontium Salts—Prevention of Chloroform Accidents—Hypnal, *alias* Monochloral-antipyrin—Salt not Incompatible with Calomel.

Although many "working" French practitioners have been away, attending the Berlin Congress, and a goodly share of attention was paid to the proceedings, Paris has not been without its usual quota of scientific news and discussions. It is not within the province of your correspondent to speak of Berlin, yet it may not be out of place to here mention that some misgivings are expressed at the selection of Rome for the next gathering. The choice recalls to one's mind the fate of another kindred Congress,—namely, that in charge of the projected International Pharmacopœia. Several triennial meetings were called, and punctually held, in various European capitals, the last one being at Brussels in 1885. The project was progressing most favorably, and it looked as if one more Congress would complete the undertaking, when, in an evil hour, the members at Brussels accepted Italy's pressing invitation for 1888. Rome, said the Italian delegates, had no convenient meeting-hall, but Milan had. So Milan was selected. Well, in 1888 the local committee were not ready, and postponed action to 1889; in 1889, owing to the Paris Exposition, they postponed it again to September, 1890, without fail. And now they have confessed their utter inability, and the whole project has vanished into thin air. It is to be hoped history will not repeat itself in the case of the International Medical Congress.

While investigating the effects of various metals on the living organism, with a view to ascertain the truth about the relation supposed to exist between atomic weight and toxic properties, Dr. J. V. Laborde has made interesting observations, which he related at a recent meeting of the Paris Society of Biology. To begin with, it must be confessed that the atomic theory was found to work rather indifferently in therapeutics. But a more practical result has been a better knowledge of the physiological

properties of strontium salts, both by themselves and by comparison with the corresponding barium, potassium, and calcium combinations. The most important point elicited was the harmlessness of strontium, not only comparative, but also absolute. Gmelin, in 1824, already pointed out the fact. But while he chiefly experimented with the rabbit, a non-vomiting animal, Dr. Laborde operated on the guinea-pig, rabbit, dog, and on man. Not to enter into particulars, dogs weighing from thirty to forty-five pounds, after being repeatedly given from 2 to 3 grammes (30 to 45 grains) of strontium chloride in solution, showed no appreciable symptoms except a diuresis, which will be noticed again hereafter. As to the effects on man, the chemist, who supplied the products voluntarily, took in his food 2 grammes of strontium carbonate daily for six weeks, and never experienced any local or general effects attributable to the substance in question. The contrast with barium is a striking one. Although closely related, chemically, the two metals are, therapeutically, as dissimilar as possible, since barium salts have long been known to be violent poisons, even in small doses. Their physiological properties are too familiar to now need more than a passing allusion. More interesting is the comparison of strontium with potassium. While intramuscular or hypodermic injections of 25 centigrammes (4 grains) of strontium chloride in young guinea-pigs, or .50 to 1 gramme (8 to 16 grains) in rabbits, failed to have any effect, 8 centigrammes of potassium chloride, or sulphate, for guinea-pigs, and 40 centigrammes (7 grains) for rabbits, caused paralysis, first in the limb injected and subsequently in the whole hind quarters. Moreover, an injection of 160 centigrammes (25 grains) of potassic sulphate will suffice, in twenty-four hours, to kill a twelve-ounce guinea-pig, with symptoms of collapsus and asphyxia, and it should here be noticed that potassium chloride is more easily tolerated than either the iodide or nitrate of the same base. Now, to compare strontium with calcium, it was observed that while both proved almost equally harmless, the difference appeared to be rather in favor of strontium, intravenous injections of calcium chloride having caused vomitings, which never occurred with like doses of the strontium salt. And, lastly, strontium lactate was, somewhat unexpectedly, found to possess marked diuretic properties which may become useful in therapeutics. A dog, for instance, was observed to copiously urinate once a minute for nearly twenty-five minutes after being given, through the stomach-pump, 72 centigrammes (11 grains) of the metal, corresponding to about one grain per pound of body-weight. Of course further experiments will be needed before strontium lactate can be recommended in human medicine, but the remark is not without interest to therapeutists.

At the Academy of Medicine chloroform accidents and their prevention have been the subject of a long discussion, lasting over seven sittings. Although the chief debaters—Drs. Laborde, Verneuil, F. Franck, Le Fort, Guérin, and Labbé—are all men of acknowledged talent and experience, it cannot be said anything very new or striking was elicited respecting the mechanism and various causes of death under chloroform. But on one point—namely, to prevent reflex laryngeal accidents caused by the irritating vapor, as well as to avoid their effect on cardiac centres—Dr. Laborde has recommended a method which directly pertains to therapeutics. "Morphine," he remarked, "has been proposed to lessen peripheric sensibility, and some clinicians use it occasionally, but others object to it as tending to cause syncope. However it may be, I have tried to use in its place narceine, a substance presenting none of its disadvantages. Unfortunately, the principle isolated in 1868 by Rabuteau was very sparingly soluble, and consequently rather unmanageable. But recent experiments, undertaken in connection with M. Duquesnel, have enabled us to prepare a special soluble narceine possessing the same medical properties as the old one. Our researches being still incomplete, I cannot for the present describe the process of preparation, but here you can see a specimen of the substance, and a small vial of the liquid holding 1 gramme (16 grains) of it in perfect solution." A sealed letter respecting said preparation was at the same time by Dr. Laborde laid in the hands of the secretary for future reference. Continuing his communication, he said the narceine in question was tried with invariable success on animals to be chloroformed, quiet and easy sleep, unaccompanied with either vomitings, torpor, or other accidents being always obtained. Another method, almost as effective, is to paint with a solution of cocaine the larynx, inner throat, and pituitary membrane. The next point—that is, the lessening of the pneumogastric and cardiac centres excitability—might, in Dr. Laborde's opinion, be secured by means of either curare or atropine. The first is too unmanageable at present for human therapeutics, but the second has

been used with success by some practitioners, at Lyons especially. The chief objection against the alkaloid is that large doses, verging on the poisonous, have to be used. Indeed, it is a question whether the moderate quantities employed by the Lyons surgeons can have any effect on the pneumogastric. Before concluding, it must be said that, although Dr. Laborde's theories deserve consideration, they were not concurred in by all at the Academy, especially as regards atropine. It should also be remarked that considerable obscurity still surrounds the true nature of narceine, some chemists even asserting that the supposed alkaloid of that name, studied by Claude Bernard, has no existence in fact.

Hypnal, or monochloralantipyrin,* keeps attracting the attention of experimenters and therapeutists. Chloral and antipyrin will form two definite crystalline combinations, one containing 1 and the other 2 equivalents of chloral to 1 of antipyrin, and therefore named mono- and bichloralantipyrin respectively. After experimenting with animals, Dr. Schmidt (Nancy) has found that as a soporific one gramme of the mono-salt is equivalent to .55 gramme of chloral, and the bi-salt to .60 gramme. Both will lower the temperature, but the bichloral more so than the mono in equal doses. On respiration they act much like chloral hydrate, but on arterial pressure and cardiac contractions they have less effect than chloral. On being taken in the stomach, monochloralantipyrin is more poisonous than the quantity of chloral it contains, and the bichloral still more, but to a slight extent only. Taken altogether, the mono-salt was found to have over chloral the advantages of being more easily administered, affording more marked soporific effects, and, lastly, disturbing circulation to a lesser extent. As to bichloralantipyrin, there seems to be no object in substituting it for either chloral or hypnal. On the other hand, Dr. Gley (Paris) also, after animal experimenting, thinks there is no difference between the poisonous properties of the two compounds, and believes their physiological properties are exactly the same as those of plain chloral. And, finally, Dr. Fraenkel, from thirty-three observations, in hospital and city practice, has concluded that hypnal, being nearly tasteless and quite odorless, besides devoid of all irritating action on the mouth or stomach, is easier to administer than chloral, especially when treating children or delicate patients. As it possesses both hypnotic and analgesic properties, it is an unrivalled soporific, especially when sleeplessness proceeds from physical pain. Owing to its sparing solubility, hypnal is to be given either suspended in a mucilaginous potion or dissolved in a spirituous elixir. It may also be administered in capsules, or even cachets. The usual dose for an adult is 1 gramme (16 grains), but as much as 1.5 grammes (24 grains), or even 2 grammes, may without danger be given, when pain and sleeplessness are intense.

A pet theory of Mialhe's was that calomel in the economy is decomposed by alkaline chlorides into mercuric chloride. Although contradicted by many eminent chemists and physiologists, this simple and attractive method of explaining the efficacy of a substance as insoluble as calomel, has to this day been adopted and taught in most medical colleges. In vain were chemical experiments brought to bear against the theory, its partisans, though losing some of their assurance, would find good reasons for holding on to their faith, objecting that the access of air is necessary, that the presence of organic matters is of importance, and that things in glass proceed differently than in the economy. Now, Dr. Paul Adam, in a communication to the Society of Therapeutics, appears to have dealt to the cherished dogma its final blow. It is important, however, that ammonium chloride should be excepted from the argument, as its effects on calomel are undoubted. But chloride of sodium, as proved by former experiments repeated by Dr. Adam, will not dissolve calomel in appreciable quantities when macerated for three days with water in a close vessel. A dog's gastric juice was found equally inert at blood heat in a close vessel, and so was extract of meat. Comparative experiments with calomel alone, and calomel followed by the ingestion of very salty aliments, proved the effects to be exactly the same under the same circumstances. Without here detailing all the experiments, we may quote the following conclusions, arrived at with apparently good reason. In the contact of air, and near the boiling-point of water, calomel may be decomposed into sublimate under the influence of alkaline chloride, and chiefly ammonium chloride. That much has long been known. But in a close place, even in the presence of organic matter, salt will not decompose calomel to any appreciable extent. Hence when calomel is not taken on an empty stomach, it is quite indifferent how salty the food may be; and, lastly, sodium chloride is not incompatible with calomel.

PARIS, August 22, 1890.

* See the THERAPEUTIC GAZETTE, April, 1890, page 277.

BERLIN.

(From our Special Correspondent.)

THE INTERNATIONAL MEDICAL CONGRESS.

I write you this letter while standing under the shadow of the important days that have just passed. The Tenth Session of the International Medical Congress has just closed; but all its participants will cherish it with pleasure in their memories. Each one of the numerous American visitors, of which there were more than five hundred, will be able to confirm this statement, or, at least, I have learned as much at different times from ladies and gentlemen. On all sides there can be found only kind and congratulatory feelings towards the entertainers, and naught but a continuous strain of praises is to be heard about everything,—the city, as well as its sanitary and medical arrangements. We inhabitants of Berlin were, indeed, aware that in the last twenty years our city had begun to grow and bloom, and that it had made gigantic strides in every direction. But upon such an extraordinary occasion as that of an International Medical Congress—and, moreover, the first of these more important medical assemblies ever held in Berlin—it was perfectly natural for us to feel a certain anxiety as to whether success would crown our efforts; and that we have most amply succeeded, it will be no self-conceit for us ourselves to declare. Whoever has studied the scale upon which the details and arrangements were carried out must certainly confess that the efforts of all the contributors to the undertaking, especially during these latter months, must have been almost incalculable, in order to have prepared everything in a manner so suitable for the reception and entertainment of our guests. Moreover, not only the external and immediate results of the international session were a success, but its ultimate literary and scientific effects will be beneficial, as, it is to be hoped, will soon be proved by the sequel. Except during very short interruptions, the work was carried on in the separate sections from eight o'clock in the morning until five in the afternoon, in order to get over the amount of accumulated material. The programme of the Congress alone embraced sixty-eight departments. Eighteen different divisions were present, and the whole number of papers presented were, at least, eighty-eight, and during the session their number was increased by many more. Then, too, a scientific, medical gathering has been held, the mere memory of which fills with satisfaction us who had worried ourselves by prematurely fretting about it. Such an International Medical Congress has never met anywhere before, and it has afforded a fine view of the ceaseless advance made by therapeutics during the last decade.

In order to give an idea of the immensity of the Congress, I shall here quote the following figures: There were present five thousand seven hundred and thirty-seven members, one hundred and forty-three special visitors, and thirteen hundred and seventy-six ladies. Two thousand eight hundred and nineteen of the members were foreigners. In all there were issued seven thousand two hundred and fifty-six cards,—a number reached at no former Congress.

On Saturday, August 2, after an address by General Secretary Lassar, the meeting was declared open by Virchow in the Exhibition Park. These rooms, the magnificent art collection having been specially arranged by the artists of Berlin for the occasion, would have been a treat to see. Both speakers mentioned the great difficulty that had been sustained in their efforts to find a favorable place in which to hold their meeting, which question had been finally settled only by the untiring zeal of Chief-Marshal Gossler. At this point Kohler, director of the Imperial Board of Health, read an essay, which insured to the Convention the assistance of the authorities towards the success of the undertaking.

On the 4th of August the opening of the Congress proper followed in the magnificently decorated inclosure of Renz Square, which is calculated to hold more than five thousand persons. This gigantic space was filled to its last seat. Virchow spoke of the tremendous strides that Berlin had made during the last few years in sanitary science. Lassar dwelt on the relations of the Congress with the external world, and in this connection sent the following greetings to Kaiser Wilhelm and the Chancellor of the German empire through State Secretary Bottscher, and likewise to Prussia through her minister, Gossler; to the city of Berlin through Mayor Forckenbeck; and to the doctors of Germany through a present member of the German Society of Physicians,—viz., Alderman Graf.

At this point Joseph Lister, of London, delivered an essay, entitled "The Present Position of Antiseptic Surgery;" and Robert Koch, of Berlin, also spoke, "Ueber Bacteriologische Forschung," or "On Researches in Bacteriology." He announced that he had probably succeeded in finding a remedy against tuberculosis, and we hope shortly to learn more on

the subject from him. When an observer of so much authority as Koch makes such a remark as this, we may be certain that there is some positive fact to serve as the basis of his assertion. In the afternoon, arrangements of the different sections were seen to, and in the evening everything gathered for a delightful time in the Exhibition Park, where, after refreshments, a little dancing was indulged in by these serious men of science.

On the next day the assembly was broken up into various divisions, and in the evening the city of Berlin invited the visiting members to be their guests in the magnificently-decorated rooms of the court-house. On the great flight of stairs leading to the building stood, in great state, the mayor of Berlin, together with the members of the Board and other civil officials, in order to greet personally each visitor with a hearty handshake. An unbounded pleasantry reigned at every table.

On the next day, besides attending to the classification of the individual sections, a second general meeting took place. Bouchard presented an essay on "Le Mécanisme de l'Infection et de l'Immunité," or "The Mechanism of the Spread and Prevention of Disease;" and Axel Key, of Stockholm, addressed the meeting on "Die Pubertätserscheinungen und das Verhältniss derselben der Krankheitserscheinungen der Schuljugend," or "Development during Puberty, and its Connection with Disease in Youth." In the evening dinners were given at different places by the various sections, and the toasts delivered at them will not soon be forgotten by their participants, proving, as they did, that medicine is really an international science, and destined by the repetitions of such Congresses as this to bind into a universal brotherhood the different members of human society.

On the 7th and 8th instants the sessions were busy. On the evening of the 7th balls were given in five of the greatest places in Berlin. On the afternoon of the 8th there was a reception given to some invited members of the Congress by his majesty in the new palace at Pottsdam, and in his place Prince Friedrich Liepold received the guests. On Saturday, August 10, the last meeting took place in Renz Square. Virchow announced that it had been decided to accept an invitation of Baccelli's to hold the meeting of the next Congress at Rome. The following papers were then read: Horatio Wood, of Philadelphia, "On Anæsthesia;" Cantassi, of Naples, "Ueber Antipyresin," or "On Antipyresin;" Meynert, of Vienna, "Das Zusammenwirkung der Gehirntheile," or "The Unity of Cerebral Action;" Hockvis, of Amsterdam, "Ueber Vergleichende Russenpathologie und die Widerstandsfaehigkeit in den Tropen," or "Comparative Russian Pathology and the Capacity of the European for Tropical Endurance." Hereupon followed the valedictory addresses of the president and various members. Baccelli, of Rome, delivered an essay in Latin, which was replied to by Virchow, whereupon both men embraced each other amidst rapturous applause. In the afternoon the sections were concluded, and in the evening a concert at Knoll was given, to which the physicians of Berlin had invited the members of the Congress.

The pharmacological section was opened by Professor Liebreich as president of this division, for which Professor Langgaard officiated as secretary during the whole time of the Congress. Professor Liebreich was elected president, and, upon his nomination, Mr. Schmiedeberg was chosen vice-president. Of the papers presented, the following are to be mentioned: Mr. Pohl, "Ueber Ipernin;" Mr. Petresco, "Ueber die Hyperkenetische Wirkung des Kaffeins;" Mr. Poulzon, "Ueber die Giftige Bestahdtheile des Aetherisches Filixextractes;" Mr. Robert, "Cetrarin;" Mr. Nitschman, "Ueber Sozojodol;" Mr. Van der Corput, "Ueber Phosphor;" Mr. Plugge, "Ueber Andromedoloxin;" Mr. Zuhler, "Ueber Ilex Paraguensis;" Mr. Schmidt (Astrachan), "Ueber die Natur des Fischgiftes;" Mr. Pohl, "Ueber Aufnahme und Vertheilung des Chloroforms im Thierkorper." Mr. Lauder Brunton showed the results of his experiments with chloroform, and Mr. Liebreich demonstrated his experiments in vacuo with chemical reactions. As a mere recreation, a glance at the works of dental pharmacology was here indulged in, embracing, as it did, from 1865 to the year 1889, and edited by Messrs. Binz, Boehm, and Liebreich, and revised by Dr. Wurzburg; likewise a work by Mr. Robert, entitled "Untersuchungen aus seinem Laboratorium." At the subsequent sessions, the following gentlemen, already members, were elected honorary presidents: Petresco, Albertoni, Lauder Brunton, Berlioz, Plugge, Van der Corput, Leech, Phillips, and Brondgeest. Later there was a spirited discussion in regard to the Pharmacopœias of different countries, when Langgaard was chosen the medical and Dr. Hirsch the pharmaceutical referee. Mr. Liebreich said that whenever, as at present, no positive conclusion was arrived at immediately, and when it were possible, that the question

and answer serve as a basis for a further discussion at some later meeting of an international character, and at the same time this was regarded as a means by which a nearer relation might be constructed between scientific medicine and scientific pharmacy. The medico-scientific association has left a magnificent impression, especially as for each part of it there were subjects which had their appropriate objects. I propose to speak of the pharmaceutical exhibition, as well as of several other subjects of interest in regard to the Congress, when I write you my next letter.

BERLIN, August 17, 1890.

Notes and Queries.

DISINFECTION BY FUMES OF BURNING SULPHUR.

The question of the value of dry sulphurous acid, evolved by burning sulphur in a closed place, as a method of preventing the spread of infectious diseases, seems as yet to be undecided.

In Detroit it appears that this method, hitherto made compulsory in all cases of infectious diseases, is about to be abandoned; an action which, to our minds, seems undesirable, for, at any rate, it has not been positively established that the method is useless.

The following letter received from the secretary of the Michigan State Board of Health, addressed to the health officer of Detroit, seems to show that the action of the Detroit city authorities does not receive the sanction of the State Board of Health:

"MICHIGAN STATE BOARD OF HEALTH,
"OFFICE OF THE SECRETARY.
"LANSING, MICH., August 7, 1890.

"SAMUEL P. DUFFIELD, M.D., *Health Officer of the City, Detroit, Mich.:*

"DEAR DOCTOR:—In the Detroit newspapers to-day, in a synopsis of your annual report, I see that you propose to displace disinfection by fumes of burning sulphur. Permit me to ask your attention and that of the Detroit Board of Health to some facts which bear on this subject, and which could not be had except through this office. Excluding Detroit and Grand Rapids (the data from which cannot be profitably included with the data from the smaller places), the official reports to this office prove, beyond a reasonable doubt, that isolation and disinfection *do* restrict diphtheria. I send herewith three diagrams, in which are condensed the experiences of health officers throughout Michigan in over a thousand outbreaks of diphtheria in the years 1886, 1887, and 1888. They prove that in those outbreaks in which isolation and disinfection were *neglected* there were on the average, over fourteen cases, with nearly three deaths, to an outbreak. They prove that in those outbreaks in which isolation and disinfection were *enforced* there was an average of only a little over two cases, with only about six-tenths of one death to each outbreak; and it must be remembered that these figures relate to instances in which at least one case of diphtheria had already occurred in the community, and that occasionally several cases occur at once, on the start. The method of disinfection referred to is that recommended by this State board,—namely, burning three pounds of sulphur for every thousand cubic feet of air-space in a room, infected articles being loosely spread out; and, because of movement of infected articles from the sick-room and from one room to another, all rooms in the house are disinfected, together with all contents.

"The evidence of the complete success of this method throughout the State (except in Detroit, and possibly Grand Rapids) is so conclusive that it seems to me certain that any failure in Detroit must be due to some imperfection in the application of the method of disinfection. I do not claim that Dr. Chapoton's suggestion is correct, that it 'was attributable to the carelessness of the disinfecting physician.' I think it is quite likely that the failure in Detroit is due to the use of *too little sulphur*, possibly also to the use of something else with the sulphur (possibly the exact weight of the sulphur may not be correctly estimated when mixed with another substance?).

"I respectfully submit that a *few* laboratory experiments should not be allowed to prevail against two hundred and fifty successful ones in the experience of health officers in restricting actual outbreaks of diphtheria in Michigan. During the last three years the known saving of life in Michigan from diphtheria, by isolation and disinfection, has averaged one and a half persons per day.

"However, there are many laboratory experiments which coincide with the experience of health officers in Michigan. I send you herewith a hektograph copy of an account of experiments by Pasteur and M. Roux, with the co-operation of Dujardin-Beaumetz, which prove both the points which I desire

to make,—first, that the burning of two pounds of sulphur per one thousand cubic feet of air-space is *not* always certainly effective; and, second, that three pounds *is* effective. This applies to a closed room. If there are openings through which the fumes may pass, more sulphur is required.

"Permit me to suggest that if any method of disinfection is adopted which involves the movement of infected clothing or other articles through the streets to a central disinfecting station, that no such removal be permitted until after such articles have been submitted to disinfection by fumes of burning sulphur, or by chlorine gas or other equally effective gaseous disinfectant, which shall thoroughly permeate the room and contents.

"From my practical experience and observation with such disinfectants, I wish to commend the method by fumes of burning sulphur *without* the addition of extra moisture to the atmosphere. When such moisture is added many valuable articles are destroyed which without such moisture would not be injured.

"I trust that this entire subject will receive thorough investigation by your board, and I shall be glad to be informed of the result. The State Board of Health desires to utilize, for the entire State, all new methods and all new facts which you can supply on this important subject.

"Very respectfully,

"HENRY B. BAKER,

"*Secretary.*"

Experiments by Pasteur and M. Roux, in the Cochin Hospital, of Paris, were carried on under the observation and with the co-operation of Dujardin-Beaumetz, physician to the hospital, and one of the most eminent medical authorities of France. Dujardin-Beaumetz makes a summary report of the experiments, in a work entitled "Les Nouvelles Medications."* A few paragraphs from pages 76 and 77 of this work show substantially as follows:

"Twenty grammes of sulphur to a cubic metre (1.53 per thousand cubic feet of air-space) destroys the different micro-organisms in a moist state, but it is necessary to increase this dose if one wishes to destroy some organisms in a dry state. In fact, since the last communication to the Academy M. Bardet and myself, aided by M. Chambon, have continued these experiments upon micro-organisms in a dry state, and particularly upon vaccine virus. We have taken from the pustules of vaccinia, scabs, which we have reduced to fine powder, and placed in chambers where were variable quantities of flowers of sulphur. When a dose did not exceed 20 grammes per cubic metre, the vaccine powder did not lose its properties, and one could by inoculating animals and infants obtain a vaccine eruption.

"With 30 grammes per cubic metre (2.297 pounds per thousand cubic feet of air-space) the results obtained were uncertain,—sometimes the powder loses its properties; but when the dose is increased to 40 grammes per cubic metre (3.06 pounds per thousand cubic feet of air-space) the inoculations are always inactive. So, then, for vaccine, and probably for variola, if one desires to destroy the contagious 'germs' in a dry state, it is necessary to double the dose of 20 grammes, which we have already fixed.

"According to the experiments of Vallin and of Legouest, 20 grammes are sufficient for typhoid fever; while, according to Vallin, 40 grammes are necessary for the microbe of tuberculosis.

"(In the case of beef-tea cultures, the dose must vary according to the micro-organisms experimented with.)

"The results at which we have arrived are absolutely confirmative of those which have been previously obtained by Pollikof, of Milan, Pettenkofer, of Munich, Dougall, of Glasgow, Fatio, of Geneva, and Pietra Santa, of Paris; and, finally, of the researches of Vallin, published in his able work upon disinfectants."

* Translation for this note has been received from John H. Kellogg, M.D., Battle Creek, Mich.

THE DOSE OF THE ALKALOIDS OF HYOSCYAMUS.

We have on several occasions published in the GAZETTE discussions as to the proper dose of the alkaloids of hyoscyamus, and a remarkable case of supposed poisoning by hyoscyamine, which recently occurred in Brooklyn, bears upon this point (*New York Medical Record*, August 9, 1890.) A patient suffered from alcoholism and its accompanying excitement and insomnia. He was prescribed, it is stated, capsules containing an eighth of a grain of amorphous hyoscyamine. Two doses were taken, the second one two hours after the first, and immediately succeeding the latter dose the patient began to show symptoms of hyoscyamine-poisoning,

and he died in a few hours. It is asserted that the investigation showed that the crystalline hyoscyamine was used instead of the amorphous, hence the toxic effects. The drug-clerk who put up the capsules was arrested. By some mistake the body was embalmed, so that the autopsy showed nothing, except, perhaps, a hypertrophic cirrhosis. It is also stated that the doctor's original prescription has disappeared. The drug-clerk asserts that he put up the medicine just as it was written, and there is no proof to the contrary, except that of a circumstantial character.

Even if there were, however, it is doubtful if the drug-clerk could be made responsible. For there is still the greatest discrepancy in standard text-books as to the dosage of the various alkaloids of hyoscyamus. Brunton's work, published last year, makes the astonishing statement that the dose of hyoscyamine is from grain $\frac{1}{60}$ to grain 1. If a professor of pharmacology says this, what can one expect of a drug-clerk? Several text-books also say that amorphous hyoscyamine is identical with hyoscine; and this is a serious error. Yet, even if it were true, cases are reported in which a dose of grain $\frac{1}{5}$ of hyoscine has been given without serious results.

The great disagreement with regard to the dose and toxicity of the hyoscyamus alkaloids is shown in the following notes:

Lemoine (1889) gives the dose of hyoscyamine as grain $\frac{1}{60}$ to $\frac{1}{120}$.

Doses of grain $\frac{1}{40}$ and grain $\frac{1}{10}$ have caused toxic but not fatal symptoms according to Drs. West and Thompson.

The dose of hyoscyamine is the same as that of atropine, according to Nothnagel and Rossbach.

The dose of hyoscyamine sulphate is grain $\frac{1}{60}$ to grain 1, says Brunton, in 1889.

Hyoscyamine has maximum dose of grain $\frac{1}{3}$, according to Gnauck, 1881; that of hyoscine is grain $\frac{1}{30}$.

The U. S. Dispensatory gives the initial dose of hyoscyamine sulphate as grain $\frac{1}{60}$; that of hyoscine is not given.

The dose of hyoscine, according to Budder, in 1888, is grain $\frac{1}{100}$.

According to S. Fischer it is grain $\frac{1}{120}$ to $\frac{1}{60}$.

A dose of grain $\frac{1}{3}$ was given by mistake without bad effects by Dr. W. H. H. Githens.

Dr. King has used hyoscine in doses of grain $\frac{1}{124}$ to grain $\frac{1}{68}$.

Toxic symptoms were caused by doses of grain $\frac{1}{80}$ and $\frac{1}{75}$, also by a dose of grain $\frac{1}{100}$ (Prentiss).

The maximum dose of hyoscine is grain $\frac{1}{200}$, according to Dornblüth, 1889.

Cases of non-fatal poisoning from doses of grain $\frac{1}{25}$, $\frac{1}{50}$, and grain $1\frac{1}{120}$ are reported by Drs. S. W. Morton, J. S. Gibb, and W. A. Edwards.

E. B. Potter thinks doses of grain $\frac{1}{200}$ to $\frac{1}{150}$ are safe.

In all the above references nothing is said about amorphous hyoscyamine. This is a mixture of hyoscine with other substances, among them being a small amount of hyoscyamine. Its effects are more of a hypnotic character than the pure alkaloid, and it has been extensively used in this city as a hypnotic. The dose is much larger than that of the pure hyoscine or hyoscyamine.

BLEACHING TEETH.

A dirty-looking blue-tinged tooth in the front of the mouth is so disfiguring to the appearance that the subject seeks the aid of the dental surgeon. Such teeth are too often recklessly and ruthlessly excised, and an artificial crown attached to the root. The result is brilliant as far as appearance is concerned, and does not call for any great amount of labor on the part of the operator, but, at the same time, it is a question whether the true conservative treatment would not rather be to render the tooth presentable by bleaching and subsequent filling, which is practicable in a large number of cases. The most common cause of staining is the death of the pulp and the infiltration of the dentinal tubules with the products of its decomposition. Another cause, which is much more common than it should be, is the insertion of amalgam stoppings, especially those containing copper, and this stain unfortunately appears to be indelible. Two general classes of substances have been introduced for bleaching teeth,—oxidizing agents, such as chlorine compounds and peroxide of hydrogen, and reducing agents, as sulphurous acid. The treatment by means of peroxide of hydrogen is extremely simple, and gives good results; but it appears from recent experiments by Dr. Miller, of Berlin, that this preparation acts upon the dentine, removing the organic matter. Sulphurous acid is also open to a similar objection, in that its prolonged use will dissolve out the lime salts. Generally the chief chemical used for bleaching teeth is chlorine or some of its compounds. Where chlorine is used steel instruments are inad-

missible, as the salts of iron which would be formed would rapidly discolor the teeth. The instruments must be constructed of gold, platinum, or ivory. In order to prevent the chlorine from passing through the foramen at the end of the root, which would probably cause acute periostitis, the apical third of the pulp-canal is solidly filled with gold. The tooth is isolated at the gums, the soft parts being protected by the adjustment of the rubber dam, and the tooth thoroughly dried by means of a warm air syringe. The pulp-cavity is then washed thoroughly with ether to remove any fatty material. Various preparations of chlorine have been recommended, but perhaps the simplest is freshly-made chlorine-water, as suggested by Dr. Wright, of Richmond, U.S.A., which is forced into the pulp-chamber by means of a syringe. Three or four sittings of an hour each are usually sufficient to remove the discoloration, when the tooth can be filled in the ordinary way.—*Lancet*, July 19, 1890.

A TEST for the purity of drinking-water is given as follows by PROFESSOR ANGELL, of the Michigan University: "Dissolve about half a teaspoonful of the purest white sugar in a pint bottle completely full of water to be tested, tightly stopped; expose it to daylight and a temperature up to 70° F. After a day or two examine, holding the bottle against something black, for floating specks, which will betray the presence of organic matter in considerable proportion.—*Cincinnati Lancet-Clinic*, July 26, 1890.

THE CHEMISTRY AND PHYSIOLOGICAL ACTION OF PHOSPHOROUS OXIDE.

The June number of the *Chemical Society's Journal* contains a full account of the recent research on phosphorous oxide which has been carried out jointly by PROFESSOR THORPE and MR. A. E. SUTTON, of the Normal School of Science, South Kensington (*Lancet*, July 26, 1890). It is a noteworthy fact that it is seldom that an inquiry into the nature of well-known inorganic elements results in the full confirmation of the characters which have usually been assigned to the substance experimented with. On the contrary, in many instances surprising results are often obtained, inasmuch as properties are frequently discovered which are found to be of a nature entirely new and opposite to those which are described in the text books. This in a measure is probably due to the circumstance that investigators have of late years devoted their time chiefly to the fascinating and fashionable field of organic chemistry. The authors have in the present research obtained phosphorous oxide by the slow combustion of phosphorus in an apparatus of special construction. So prepared, it is described as a white wax-like solid, which melts at 22.5° C. to a clear, colorless, and mobile liquid, resolidifying at 21° and boiling at 173.1° C. The formula, as deduced from the vapor density and Raoult's recent method, is P_4O_6, thus exhibiting perfect analogy to arsenious and antimonious oxide, As_4O_6 and Sb_4O_6, respectively. At high temperatures it is resolved into tetroxide and free phosphorus. Sunlight changes it to orange yellow, and ultimately to dark red; the exact chemical nature of these changes has not yet been investigated. More interesting is the action of water, alkalies, alcohol, etc., upon it. Phosphorous oxide *slowly* dissolves in water, and *in a few days* forms a solution of phosphorous acid. Most text-books describe the oxide as possessing a strong affinity for water, so much so that it combines with it with such violence that a hissing sound is produced, as with a red-hot iron. With hot water, on the contrary, the reaction is very energetic, red phosphorus, the suboxide, spontaneously inflammable phosphoretted hydrogen, and phosphoric acid being violently produced. Cold alkalies, such as caustic potash, act similarly to cold water, resulting in the gradual formation of phosphite of potassium. Hot alkalies act like hot water, phosphate and phosphoretted hydrogen being formed. Phosphorous oxide ignites in contact with alcohol, forming diethylphosphorous acid. As would be expected, it readily oxidizes to the pentoxide on exposure to air or oxygen. Under diminished pressure, oxidation is accompanied by a luminous glow, which is instantly stopped when the pressure is restored. Ozone is not formed. The melted oxide readily ignites in the air. Finally, phosphorous oxide has a well-marked physiological effect, and the authors think that the influence of phosphorus on the glycogenic functions of the liver and on tissue-change may not improbably be due to this substance. It is known that caries is produced in those persons engaged in match-factories only when exposed to the fumes, for Dr. Lauder Brunton has found that when the bone of an animal fed by phosphorus is exposed to the air, no carious change takes place; but when it is exposed

to the fumes, caries is produced. And, further, it has been noticed among match-making people that only those who have carious teeth suffer from necrosis of the jaw. This may possibly be explained by the fact that the fumes from phosphorus consist largely of phosphorous oxide, for by merely drawing air over phosphorus a deposit possessing all the characters of phosphorous oxide is obtained. The odor, moreover, is identical with that of phosphorous oxide, and also with the peculiar smell that invariably accompanies the making and handling of the composition used for match-tipping. Under these circumstances, it is extremely probable that pure phosphorus possesses no smell at all. Professor Thorpe and his colleague are to be congratulated on the interesting and important results they have obtained, both practical and theoretical. Chemists, at least, will not fail to recognize the fact that much valuable and useful information has been added to their storehouse of knowledge.

NITROGLYCERIN IN ASTHMA.

DR. HOFMAN has recommended subcutaneous injections of nitroglycerin in doses of $\frac{1}{120}$ to $\frac{1}{180}$ of a grain. In angina pectoris and severe asthma he claims that the effects of these injections are remarkable. No objectionable after-effects have yet been observed.—*Pharmaceutical Journal and Transactions*, June 28, 1890.

FOR THE RELIEF OF EARACHE.

Take 5 parts of camphorated chloral, 30 parts of glycerin, and 10 parts of oil of sweet almonds. A piece of cotton is saturated and introduced well into the ear, and it is also rubbed behind the ear. The pain is relieved as if by magic, and if there is inflammation it often subsides quickly.—*Medical Brief.*

THIOL IN SKIN-DISEASES.

PROFESSOR SCHWIMMER, of Buda-Pesth, has used thiol—a substance very similar to ichthyol, but free from unpleasant odor, and made by heating gas-oil with sulphur—in a large number of skin-diseases with remarkable success. In herpes zoster, acne simplex, and rosacea, in moist eczema and in burns, he paints the affected part with a solution in distilled water, of the strength of 1 in 4, twice a day, not washing the application off for two or three days. In some long-standing cases the washing is still longer delayed. In some cases an ointment (1 in 3) was employed, and in some the dry powder itself.—*Lancet*, July 5, 1890.

THE TREATMENT OF CROUP.

DR. OSIECKI has proposed the insufflation of a powder composed of 22½ grains of tannin and 30 grains each of sublimed sulphur and chlorate of potassium in the treatment of croup (*Répertoire de Pharmacie*, July 10, 1890).

The *Concours Médical* of June 21, 1890, states that the druggists to whom this prescription was sent very properly refused to make it up, on the ground that such a mixture would inevitably cause the death of the child, stating, as an explanation, that a mixture of the substances so prescribed forms an explosive product. Dr. Osiecki, however, states that on mixing the three powders in a box and shaking them, they may be caused to unite without any danger of deflagration. Nevertheless, the editor of the *Répertoire de Pharmacie* believes, an opinion with which we coincide, that the druggists would be perfectly warranted in refusing to make up such prescriptions, and that a better plan, if there is any value attendant to this prescription, would be to perform the insufflation separately with the chlorate of potassium, and then with the mixture of sulphur and tannin.

THE EFFECT OF OIL AND OTHER SUBSTANCES ON THE SECRETION OF BILE.

DR. ROSENBERG, by means of establishing biliary fistulæ in healthy dogs, has been able to extend somewhat our knowledge of the effects of different foods and drugs on the secretion of bile. It was found that towards the end of the three months during which the experiment continued, the quantity of bile diminished, but its consistency increased, probably through a deficiency of water. When the animals were kept without food, it was found that the flow of bile increased and decreased at the same periods of the day that it did when they were fed in the ordinary way. During the first hour of digestion the quantity increased, attaining its maximum during the second hour, after which it rapidly decreased, the consistence increasing as the quantity decreased. When fatty or oily substances were ingested, a stimulating action on the secretion was produced, a larger quantity

of bile being secreted than when albuminoids or carbohydrates were taken, even large quantities of these substances producing far less bile than much smaller quantities of oil and fat. Indeed, these latter bodies possess a higher power of stimulating the secretion of bile than any other food or drugs, with the single exception of ox-gall, which, when taken by the mouth, increases both the quantity and the consistence of the bile excreted. Salicylate of sodium increases the quantity but diminishes the consistence of the bile. The action of Durand's remedy—turpentine and ether—was found to be entirely due to the turpentine, which has a high stimulating power for the bile-secreting function of the liver. Carlsbad salts were tried both in gelatin capsules and in solution; their effect was to decrease the quantity and to increase the consistence.—*Lancet*, July 26, 1890.

THE ACTION OF MONO- AND BICHLORAL ANTIPYRIN.

At the meeting of the Société de Biologie, held July 5, 1890, DRS. QUINQUAUD and SCHMIDT stated that as the result of their investigations they had found that the monochloral antipyrin possessed the advantages over chloral of more ready administration and more marked hypnotic effects, with less marked action on the circulation. They were not, however, prepared to make any definite statements as to the analgesic properties of this compound.

On the other hand, they state that the bichloral antipyrin possesses no advantages over the monochloral antipyrin or the chloral hydrate. The authors thus serve to confirm the investigations of Dr. Gley on this subject.

INJECTIONS OF ETHER FOR NEURALGIA.

DR. KUMS, of Antwerp, has conceived the plan of using subcutaneous injections of ether in the treatment of neuralgia. For the most part the patients on whom this method was practised were subjects of rheumatism. The quantity of ether employed for each injection is a cubic centimetre; in other words, the amount which an ordinary Pravaz syringe will hold. The author prefers to use Hoffmann's anodyne, containing equal parts of ether and alcohol. The injection should be made as near the seat of pain as possible. Some smarting ensues as the injection is made, but this soon passes off. The injections have been used by the author in various cases of sciatica, cervico-brachial neuralgia, cranial and facial neuralgia, and many other neuralgic conditions. Often a single injection has sufficed. In a certain number of instances two or three have been found necessary.—*Medical Press and Circular*, July 30, 1890.

OTORRHŒA PELLETS.

DR. SHIELD in the *Practitioner*, as quoted by the *American Journal of Pharmacy* for August, 1890, recommends the use of pellets containing various medicinal substances prepared with cocoa-butter. After inserting a pellet, the patient is ordered to lie down with the affected ear uppermost, when the pellet will melt and the liquid come into contact with the affected parts.

In this connection it may be mentioned that a solution of boric acid, 6 parts to 150 each of glycerin and water, has been recommended as very efficient in softening earwax; the solution is warmed, and 5 to 10 drops of it are put in the ear twice a day.

ANÆSTHETIC MIXTURES.

In an article by OESTERLEIN on chloroform narcosis (*Deutsche Med. Zeit.*), it is stated that the purest chloroform is made use of in Germany. Von Nussbaum perfumes it with a few drops of oil of cloves, to disguise the sweetish odor. Other mixtures are the following: The English mixture: Chloroform, 2 parts; alcohol, 1 part; ether, 1 part. The Vienna mixture: Ether, 3 parts; chloroform, 1 part; or, chloroform, 3 parts; alcohol, 1 part; ether, 1 part. The French mixture: Chloroform, 4 parts; alcohol, 1 part. The Strasburg mixture: Chloroform, 1 part by measure; dimethylacetal, 2 parts by measure. Methylene bichloride and its compounds with ethyl and methyl alcohol, appear to yield no better results than chloroform. The lethal dose of chloroform is very variable; while death has followed from 1.5 grammes, by the exercise of greater caution as much as 200 grammes has been given with impunity. Haffter mentions it as characteristic of the bromide of ethyl narcosis that sensation is abolished long before consciousness.—*Druggists' Circular and Chemical Gazette*, August, 1890.

X